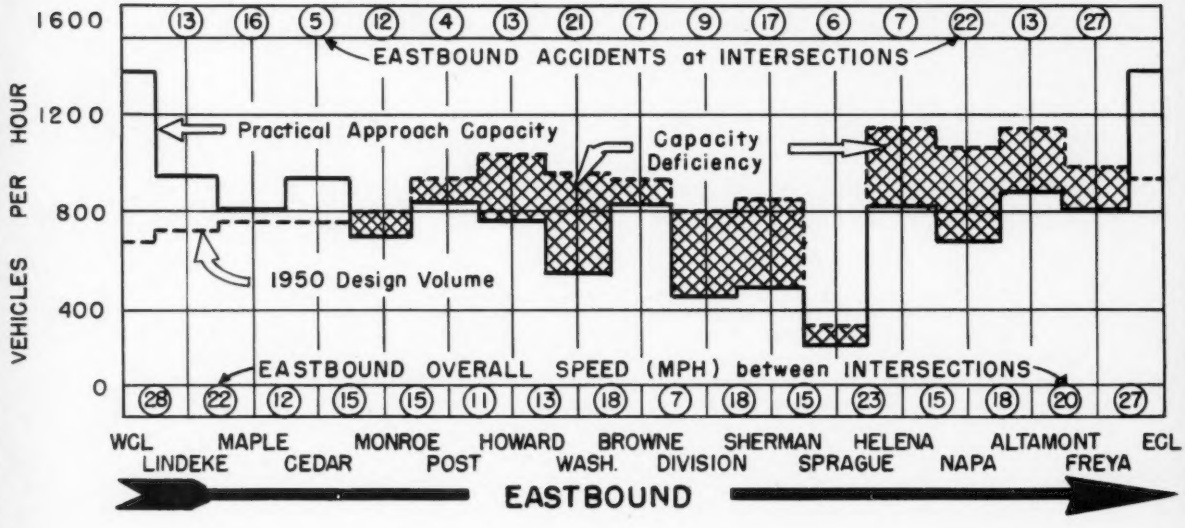
MARCH, 1951

Traffic Engineering

CAPACITY DEFICIENCY for MAJOR DIRECTION of PEAK - HOUR FLOW on PRIMARY STATE HIGHWAY No. 2 through SPOKANE, WASHINGTON



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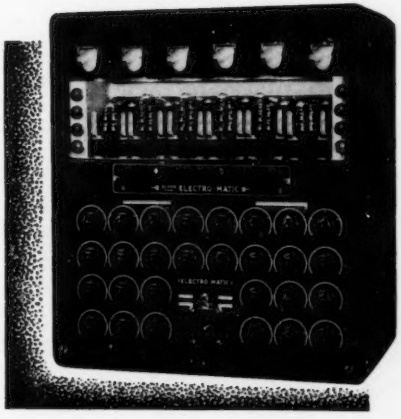

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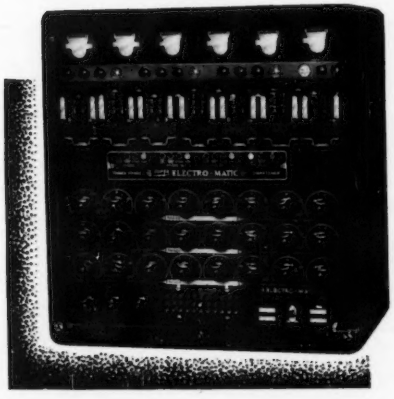

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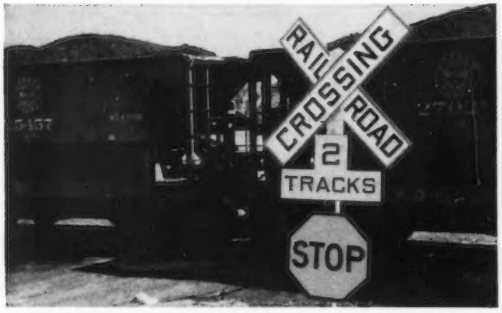

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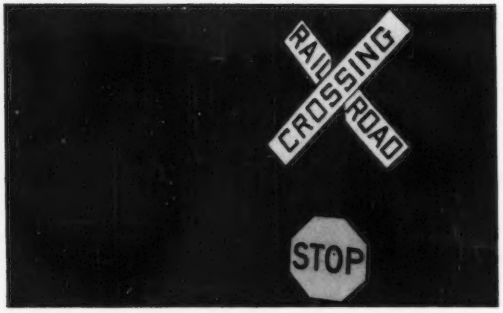

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Traffic Engineering

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

VOLUME XXI | MARCH, 1951 | NUMBER 6

COVER: Chart shown on cover is self-explanatory. Note feature article by Dunn.

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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Frankly Speaking

THE melancholy voices that say "the battle against traffic is being lost" are mounting to a new crescendo in these troubled days. Reasons for pessimism abound, with vehicle registration and use at record levels, accidents on the gain, and serious inadequacies fast developing in the nation's street and highway plant. Even the large construction program, menaced by demands associated with the world crisis and by rising costs, makes but a feeble flicker against this gloomy backdrop.

The picture is truly dark, but not hopeless. Hardship frequently has the virtue of unleashing dormant power and ingenuity. If these qualities can be soundly conceived and applied, many of today's traffic problems will be effectively resolved. The persevering exercise of operational techniques that are the forte of the traffic engineer gives assurance that a transportation chaos will be avoided, no matter the odds.

Highway engineers and planners in the traffic field deal not alone with the physical substance of our vast highway system but with people, their habits, likes, dislikes, and idiosyncracies as drivers and pedestrians. The familiar three score years and ten is too brief a span for any man or body of men to acquire more than partial knowledge of human conduct as it relates to highway traffic. Yet it is this field that promises richest returns in factual tools to meet the mounting tide of traffic.

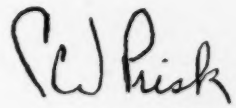
Man in the motor car or on foot often defies not only the common courtesies but the hard logic of economy, time, and distance as well, because of his higher regard for convenience and freedom of individual choice.

In some instances, strait-laced pursuit of traffic data ignores the importance of human factors and becomes only an organized way of proceeding to mathematically correct but wholly unrealistic conclusions.

In the long pull, the factor most closely entwined with the dynamic side of street and highway operation is man himself. Better understanding of the motivation for certain patterns of behavior witnessed in traffic depends upon continuing analyses of the wide variety of traffic data now being collected. The analytical process is a primary step in refining design and operation practices, and in directing intelligently driver and pedestrian education efforts.

The public, or man en masse, holds the key to the myriad problem of finance and politics that circumscribe engineering action. Here too, there is special need for mutual understanding as a basis for more helpful cooperation.

The traffic engineer must take on something of the humanist if he is to meet the present challenge squarely. If the will to win is thoroughly instilled in the public who will surely suffer in defeat, the fight against traffic pressures cannot be lost.



Director

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Urban Highway Capacity Survey

By Robert E. Dunn (Assoc. Mem., ITE)
Assistant Traffic Engineer
in charge of the Urban Traffic Engineering Section
State of Washington Department of Highways

THE 1947 Legislature of the State of Washington recognized the need for a broad review of highway, road and state requirements in the State, and for assembling the facts that are necessary for a consideration of that subject. A Joint Fact-Finding Committee was, therefore, directed to supply those facts to the 1949 session. This committee engaged a staff of highway engineering consultants of the Automotive Safety Foundation. The results of their survey are presented in "Highways in Washington's Future," a printed report of the findings and conclusions. A direct result of this report was a recommendation by the Committee to the 1949 Legislature that the responsibility for constructing and maintaining state highway routes inside cities be transferred to the State. Such a bill was subsequently enacted and signed by the Governor on March 21, 1949.

The Department of Highways thereby inherited, almost overnight, the construction, maintenance and traffic problems of approximately 423 miles of urban highway routes lying within incorporated cities. These routes, in the majority of the cases, were along the principal streets of the cities and the only major street of the smaller towns. Traffic was generally heavy in both weight and volume. This latter problem became the immediate concern of the Office of the Traffic Engineer. The new law specified that the Director of Highways is responsible for the installation, operation, maintenance and control of all traffic signals, signs and control devices in cities below 15,000 in population, and must approve the installation and operation of such items on urban highway routes in cities above that population class.

The Traffic Engineer of the Department of Highways re-organized his divisional functions and personnel into Rural and Urban Sections prior to the enactment of this new legislation, in anticipation of the many urban traffic problems that would soon be forthcoming. The Urban Section was given the authority and responsibility to engage in the following three functions:

1. To collect and assemble information concerning the characteristics of motor vehicle operation on the urban highway routes, and their hourly, daily and monthly volume patterns.
2. To review or design the installation and operation of traffic control devices on urban highway routes in conformance with adopted uniform standards and established departmental policies.
3. To develop and employ a procedure of traffic engineering studies whereby the extent of the adequacy or deficiency of urban highway routes can be measured.

Initial Study Undertaken

The opportunity to study the capacity of an urban highway route came less than a month after the Highway Department undertook its new responsibilities. On April 13, 1949 a moderately severe earthquake clogged the route of a primary highway through the Capitol City of Olympia with rubble, shoring for leaning structures and scaffolding necessary for repairs. The City Council immediately imposed a system of one-way streets as a necessary measure to handle the movement of traffic through the business district. Normal peak-hour traffic conditions under two-way operation had become quite critical, however, prior to the earthquake. The Mayor's Traffic Committee, having its foot in the door of what might be a possible solution, requested that the Department of Highways make a study of traffic conditions. This project was assigned to the Urban Section of the Office of the Traffic Engineer.

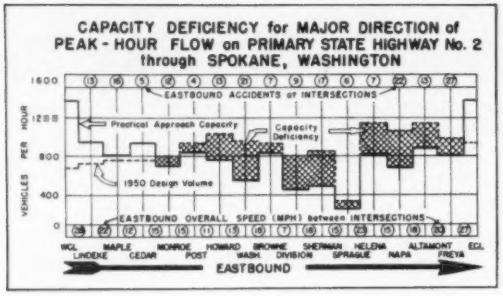
The survey procedure developed by the Urban Section was designed around research data contained in an advance copy of Part V "Signalized Intersections" of the Highway Capacity Manual.[1] Several months were spent in field studies and their analysis. Then in September 1949, the "Olympia Urban Highway Capacity Study" was presented to the Mayor's Traffic Committee. It recommended that a one-way system be retained for a portion of the urban highway route, inasmuch as the street capacity (even with its emergency overnight installation and inadequate signs and signals) had been increased by 30 per cent, and over a short period of time, accidents had been reduced by a similar percentage. The City Council passed the necessary ordinance in November to permanently establish the one-way system. The Urban Section then designed for installation, at state expense, a $33,500 system of interconnected traffic signals and uniform one-way and directional signs.

The Spokane Survey

Experience gained from the Olympia project led to improvements in the Urban Highway Capacity Survey procedure and its general adoption for use in cities both large and small. The opportunity to evaluate an urban highway route through a city of the 150,000 population class presented itself in the spring of 1950. The Urban Section was assigned to provide the necessary technical assistance to the Engineering and Traffic Engineering Departments of the City of Spokane, to find a solution to the traffic problems on the major urban highway route. The field data was collected during the summer months, and while the report has not yet been published, it is possible at this time to discuss some of the more interesting features of the objectives and procedure of the survey.

The Urban Highway Capacity Survey is prepared in eight volumes. The first seven reports contain all of the necessary analytical and graphical presentations of the field

[1]Prepared by the Committee on Highway Capacity, Department of Traffic and Operations, Highway Research Board. Available U. S. Government Printing Office, Washington 25, D. C., 65 cents.



data that are necessary for engineering reference purposes. The eighth report is a brief summary of the general findings prepared in a non-technical way for public distribution and consumption. The following is a brief description of the contents and purpose of each report:

I. *"Outline of Urban Highway Capacity Survey Procedure:"*—The objective of the "outline" is to establish the limits of the survey, the types of traffic engineering studies to be made, the number of personnel involved and the estimate of cost. This report is prepared before the survey is authorized, and is used to establish city-state agreement on all financial, political and technical matters pertaining to the project.

II. *"Accident Study:"*—An analysis of all reported motor vehicle accidents on the urban highway route is made covering the latest available one-year period prior to the start of field operations. Accident diagrams, condition tabulations, lists of high accident frequency mid-block and intersection locations, and accident and fatality rates are prepared for the entire route. Accident information is considered of prime importance in the capacity survey as it is utilized as one of the three indications of route adequacy.

III. *"Street Inventory:"*—A physical inventory is made of all geometric dimensions of the existing street design, location, type and operation of traffic control devices, type and conditions of curb parking, location and length of loading zones, and any other street or roadside condition which affects the flow of vehicular traffic. This information serves two purposes. First, it is a permanent record of street conditions during the time when the capacity survey was conducted, and second, it is exceedingly useful for reference purposes during the course of the field data analysis.

IV. *"Present and Future Traffic Volumes:"*—The primary objective of the traffic volume study is to determine the amount of traffic for which the urban highway must be designed to carry. The *thirtieth highest hour* is used as a practical criterion of the needed capacity. Records of the highest hour occurring over a period of one year are seldom available, however. To offset this lack of information, mechanical counter stations are located at strategic locations along the route to record as many of the highest hours occurring during periodic intervals in the spring and summer months as can be attained. These are then plotted in numerical order and a "design hour," approximating the thirtieth highest hour, is selected where the slope of the curve starts to change rapidly upward. Once the "design hour" volume has been established at the master stations, it is then obtained for all signalized intersections along the route by short peak-hour counts adjusted to nearby control station patterns. The projection of the "design hour" volume to ten or twenty years into the future is based upon the natural trend of local motor vehicle registration with adjustments being made for the normal increased rate of motor vehicle use.

V. *"Speed and Delay Study:"*—The average over-all speed of vehicles on the urban highway route is considered as the second of the three indications as to the adequacy of the route. An average over-all speed which is critically lower than the optimum speed will result in high traffic densities but low traffic volumes. "Cruising Car" speed checks are, therefore, used to determine the operating speed and the location, type and amount of operational delay in both the peak-hour and off peak-hour traffic streams. The average over-all speed is calculated from this information, and the specific intersections having excessive delay and congestion are located.

VI. *"Application of O & D Survey and Parking Data:"*—Available "Origin and Destination Traffic Survey" data have valuable use in determining the purpose and the length of motor vehicular trips on the urban highway route. They also assist in anticipating traffic which will be induced by contemplated improvements, and the amount of through traffic which can be expected to use a paralleling by-pass facility. "Parking Study" data are used to provide factual information to supplement technical decisions regarding one-way street systems or parking restrictions. Tabulations which correlate the block of parking, block of destination, purpose of parking, length of time parked, etc., prove helpful in providing answers to the political and economical aspects of the traffic problem.

VII. *"Street Capacity Study:"*—The capacity of the approach to each signalized intersection on the urban highway route is calculated by the use of the research data contained in the Highway Capacity Manual. Prior to the direct application of the capacity "curves," however, spot checks are made in each designated type of area to observe traffic operating under defined "practical" or "possible" capacity conditions. Appreciable differences between the "calculated" and "observed" capacities leads to either a change in area classification, or an "Area Factor" to be applied to the "curve" values. Classification and turning movement counts in the traffic volume study, and parking restrictions and loading zone limits in the "Street Inventory" report, provide the data necessary to make the adjustments for specific intersection approach conditions found along the route. Approach capacity is the third of the three indications of route adequacy. Serious urban highway inadequacy is considered to exist where there simultaneously occurs a high accident rate, a low over-all speed, and a capacity deficiency.

VIII. *"Efficient Use of Existing Street Facilities:"*—The Urban Traffic Engineering Section through its use of the "Urban Highway Capacity Survey" seeks only to make the best possible use of existing street facilities. Such recommended measures as one-way street systems and the restriction of curb parking, disrupt established habits and customs of many citizens. The final report is, therefore, written in a non-technical manner so that city officials, civic organizations and the motoring public can fully understand the findings and reasons in back of the recommendations. The report deals with only three main subjects. First, the extent of the route deficiency and the price which the community is paying in the economic loss due to accidents and congestion for the lack of an adequate facility. Second, the possible methods by which the streets along the route of the urban highway may be more safely and economically used for automotive transportation. And third, a definite time limit is established to show when normal traffic growth will exceed the best possible use of the street and a new or paralleling traffic facility will be required.

The results of the Urban Highway Capacity Survey have proven to be a sound basis upon which to obtain the best possible use from the streets as they exist today. Applications of the survey have been made where results and conclusions are obtained on certain localized route problems, in as short a time as three weeks. With wartime transportation problems and material shortages facing the nation once again, a survey of this type can be employed to intelligently adjust the use of city streets to meet changing traffic demands.

1949 ACCIDENT RATE on PRIMARY STATE HIGHWAY No. 2 through SPOKANE, WASHINGTON

SECTION OF ROUTE	LENGTH OF SEC. (MILES)	ANNUAL VEH.-MILES OF TRAVEL	ACCIDENTS DURING 1949	RATE ACCIDENTS PER MILLION VEH. MILES
Sunset Blvd.	1.39	9,491,000	66	7.0
Third Ave.	1.66	11,038,000	383	34.8
Sherman St.	0.25	472,000	3	6.4
East Sprague Ave.	2.63	18,207,000	410	22.5

USEFUL TIME LIMIT of VARIOUS INEXPENSIVE SOLUTIONS on the THIRD AVE. SECTION of PRIMARY STATE HIGHWAY No. 2 through SPOKANE, WASHINGTON

DIRECTION OF FLOW	PARKING	1950	1960	1970
TWO-WAY	BOTH SIDES	—	—	—
ONE-WAY	BOTH SIDES	+	—	—
TWO-WAY	ONE SIDE	+	—	—
ONE-WAY	ONE SIDE	+	+	—
TWO-WAY	PROHIBITED	+	+	—
ONE-WAY	PROHIBITED	+	+	+

+ Capacity Excess — Capacity Deficiency

Looking Ahead In Urban Transportation

By Henry K. Evans (Mem., ITE)
Highway Transportation Specialist, Chamber of Commerce of the U. S.

MOTOR vehicle travel at present is about 40 per cent above what is was in the last peak year before World War II. It has been steadily climbing, and there is a strong likelihood that it will not decrease unless we are involved in another full scale war. Even if this should happen, we could look forward to only a small reduction in total street and highway use. Urban motor vehicle mileage during the war years dropped only 18 per cent as compared to the same period immediately before the war. And this occurred despite the drastic cut in our rubber supply and the imposition of the various controls. Today we depend to an even greater extent on streets and highways for urban transportation due in large part to the decentralization which has continued apace during the last decade. The Census Bureau reports that of the 19 million gain in population, 15 million took place in metropolitan areas. The fringe of these areas showed a 35 per cent increase, growing almost three times as fast as the central portions which increased only 13 per cent. Take Los Angeles for instance. Whereas population within the city limits grew 30 per cent, the suburbs increased 78 per cent. This same sort of thing has happened to practically every city in the Nation.

A Big Shift in Emphasis

Despite the continued high rate of use of all our roads, we can expect a big shift in the improvement program during the coming years which will put more emphasis on major highways. In the last war the regular construction and improvement program was practically dropped and all attention shifted to roads of special value to the war effort. The mileage of the regular federal-aid system that was improved during the war years dwindled to only 25 per cent of the work done on this system during the previous four years. However, total highway construction dropped only 50 per cent. The emphasis was shifted over to construction of access roads and sections of the Strategic Network which were certified as essential to the war effort.

Evidence that the shift in emphasis during the current national emergency has already begun was provided recently by a telegram from Public Roads Commissioner Thomas H. MacDonald, Washington, D. C., to state highway departments. He advised them to go slow in advertisement and award of all projects, other than access roads which involve the use of critical materials, until the National Production Authority has clarified and determined their policies concerned with a proposed controlled materials plan. Drastic steel priorities are scheduled to go into effect on June 1 which will prohibit states and local units of government from undertaking most new capital construction projects. Defense Mobilization Director, Charles E. Wilson, in a recent letter to New York's Governor Dewey, disclosed that there will be virtually no steel available for public or private construction until 1953. Thus it is evident that any available materials for highway construction should be used most wisely, and only where they will provide greatest aid for the defense effort.

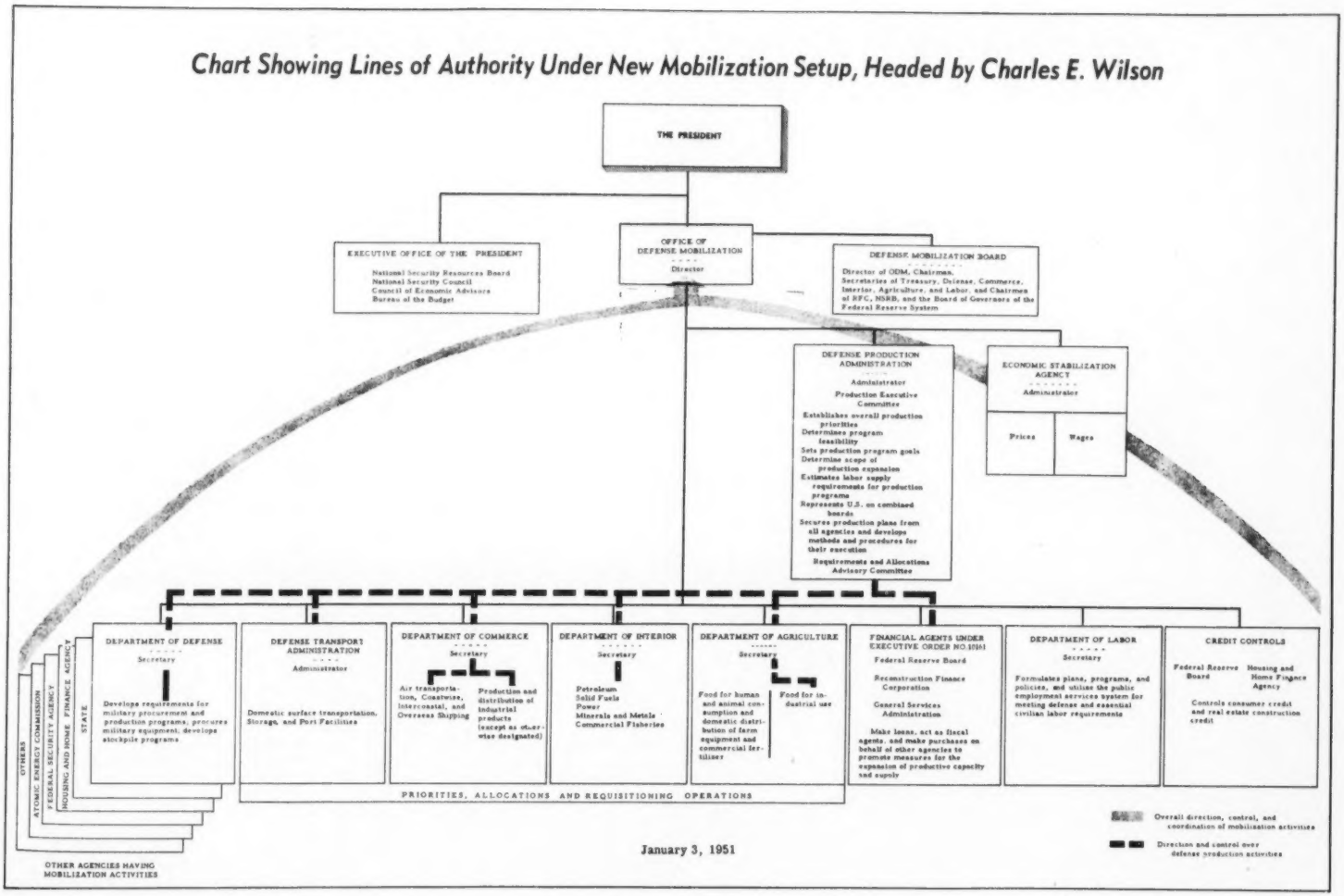
As indication of the greater reliance that we place today on our major interstate routes—justification for concentrating major attention on them—is the statement recently made by General Heileman, Chief of Army Transportation, who declared that the Army is using three times as much truck shipping service today as it used during the peak of World War II. Another case in point—a sharp trend toward heavier trucks is indicated by the fact that we have 20 times as many heavy axle loads (20,000 lbs. or over) as before the war. Coupled with this is the fact that trucks have increased in numbers by 75 per cent since the outbreak of the last war as compared to a 44 per cent increase in all motor vehicles. This points to accelerated wear and tear on major routes.

Another straw in the wind showing the trend of thinking is the recent report of the Bureau of Public Roads which indicates that half of the projects scheduled for construction on the Nation's 400,000-mile secondary system can be eliminated or re-shuffled in favor of highways leading to mineral and agricultural resources; also 12 per cent of the 219,000-mile primary system could be abandoned in favor of roads more essential to national defense. The feeling is, however, that improvement of the 38,000-mile interstate highway system, the main roads of the Nation, will go ahead as planned.

Evidence of the change in emphasis are provided by policy statements adopted in recent months by various national organizations. For instance, the National Grange, at their November, 1950, Annual Meeting, came up with the statement, "We believe and urge that in the defense period ahead, the States and federal government should place emphasis on the improvement of those roads most important to our national defense." Similarly, the American Association of State Highway Officials last December declared, "Whereas the recent alarming turn of events abroad emphasizes the pressing need for increasing the transportation capabilities of the Nation and whereas the completion of the interstate system of highways will greatly contribute to the execution of the defense program; now therefore be it resolved that the American Association of State Highway Officials . . . urges the Congress and the several States to do everything possible to expedite the construction of the inter state system of highways."

The U. S. Chamber of Commerce in action taken this year has called for a reduction in federal aid for highways among other expenditures of a non-military nature but has recommended a continuation of needed highway improvement with emphasis on essential roads. The Chamber recommends:

Chart Showing Lines of Authority Under New Mobilization Setup, Headed by Charles E. Wilson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Secretaries of Treasury, Defense, Commerce, Interior, Agriculture, and Labor, and Chairmen of RFC, NSRB, and the Board of Governors of the Federal Reserve System
DEFENSE PRODUCTION ADMINISTRATION
Administrator
Production Executive Committee
Establishes overall production priorities
Determines program feasibility
Sets production program goals
Determine scope of production expansion
Estimates labor supply requirements for production programs
Represents U.S. on combined boards
Secures production plans from all agencies and develops methods and procedures for their execution
Requirements and Allocations Advisory Committee
ECONOMIC STABILIZATION AGENCY
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Prices
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Secretary
Air transportation, Coastwise, Intercoastal, and Overseas Shipping
Production and distribution of industrial products (except as otherwise designated)
DEPARTMENT OF INTERIOR
Secretary
Petroleum
Solid Fuels
Power
Minerals and Metals
Commercial Fisheries
DEPARTMENT OF AGRICULTURE
Secretary
Food for human and animal consumption and domestic distribution of farm equipment and commercial fertilizers
Food for industrial use
FINANCIAL AGENTS UNDER EXECUTIVE ORDER NO. 10161
Federal Reserve Board
Reconstruction Finance Corporation
General Services Administration
Make loans, act as fiscal agents, and make purchases on behalf of other agencies to promote measures for the expansion of productive capacity and supply
DEPARTMENT OF LABOR
Secretary
Formulates plans, programs, and policies, and utilizes the public employment services system for meeting defense and essential civilian labor requirements
CREDIT CONTROLS
Federal Reserve Board
Housing and Home Finance Agency
Controls consumer credit and real estate construction credit
PRIORITIES, ALLOCATIONS AND REQUISITIONING OPERATIONS
OTHERS
ATOMIC ENERGY COMMISSION
FEDERAL SECURITY AGENCY
HOUSING AND HOME FINANCE AGENCY
STATE
OTHER AGENCIES HAVING MOBILIZATION ACTIVITIES
Overall direction, control, and coordination of mobilization activities
Direction and control over defense production activities

January 3, 1951

1. All levels of government should continue to support a highway improvement and maintenance program sufficient to keep our roads in proper condition to carry their share of the load, along with railroad, water and air transportation, during the defense mobilization period ahead.
2. The federal-aid highway construction program should be concentrated primarily on the 38,000-mile Interstate Highway System, maintaining the usual matching requirements for federal and state funds. The Interstate System is the backbone of the national road network, comprising only 1½ per cent of the total mileage, yet carrying 20 per cent of the traffic.

Reduced Federal Aid

Along with the shift in emphasis, we can expect a reduction in total federal aid for highways. The U. S. Chamber has asked for a $1.1 billion reduction in federal spending for public works, natural resources, and highway construction, in an effort to reduce the gap between federal taxation and spending, the basic cause for inflation. Senator Byrd has asked for an 80 per cent reduction in federal aid for highways, and although President Truman has recommended keeping the appropriation at its present level of around $500 million annually, there will be increasing pressure towards less federal spending in this as well as all other non-military programs. We can hope that, if and when federal aid is cut, what remains will be concentrated on the interstate system so as to do the greatest good for the greatest number of highway users. In the last analysis, it is important that this principle of concentrating available money on the projects that will benefit the greatest number be accepted by state, county and city governments too, since they contribute over 85 per cent of all that is spent on street and highway improvement each year. The federal share is under 15 per cent of the total.

Conservation Programs

With the realization that street and highway use will not drop much if at all and that highway improvement will probably be cut back and emphasis directed to major routes, it becomes increasingly important to make better use of today's streets. In other words, the use of one-way streets, traffic signal modernization, channelization, improved traffic engineering administration and all of the other well-known and effective measures should receive increased support.

At the same time, we should be giving more consideration to making better use of today's motor vehicles. It is a well-known fact that the supply of rubber is diminishing. President Truman says "heavy cuts in the civilian use of copper, aluminum, rubber and essential materials" are due and the National Production Authority has already cut by 17 per cent the allocation of synthetic rubber for civilian consumption. We can expect gasoline cuts too. Already there is a proposed order by the Petroleum Administration for Defense cutting octane ratings and in the event of a full scale war, requirements for fuel will undoubtedly mean curtailment of civilian gasoline usage immediately. We will depend on gasoline and other liquid fuels in this next jet-propelled war, if it comes, to a greater extent than ever before. Automobile production will be cut this year. Charles Wilson, President of General Motors, estimates a 25 per cent reduction in output from this year's record production of 8 million vehicles. With an all-out war, production would be curtailed drastically or stopped immediately.

We may find ourselves again carrying out such voluntary conservation programs as staggering of working hours, group riding programs, preventive maintenance, skip stops, short lining of transit lines and pooling of truck deliveries. This will certainly mean throwing a big load on local public transit and this should not be left out of our thinking and planning at the present time. Every effort should be made to give public transit the "breaks" and to help it develop into a stronger industry. It is no secret that this industry is going through a great economic trial brought about by ever increasing expenses and taxes in the face of reduced patronage. It stands at or near the bottom in net earnings of the Nation's industries. Therefore, when one-way streets are being laid out and other urban improvements planned, it would be well to keep these factors in mind and give local transit every possible advantage.

James K. Knudson, Federal Defense Transport Administrator, has asked for voluntary conservation of motor vehicles. In his own words, "If you can stop motors from turning over 10,000 revolutions apiece on your city streets each day, you give longer life to those motors and that may become a vital concern before we are through with this present era into which we are coming."

Defense Transport Administration

Aside from the voluntary conservation activities, urban transportation may find itself faced with compulsory measures of this sort. Such orders would come from the Defense Transport Administration which was established late in 1950 under the Defense Production Act of 1950. This organization is, as Administrator Knudson describes it, "a rebirth of the old Office of Defense Transportation" and it will undertake similar activities. It is at present mostly concerned with rail, bus and truck transportation requirements, functioning as a claimant agency to assist in interpreting transport needs for proper allocation through the Defense Production Administration; however, DTA has the authority to control all motor vehicle operation from the common carrier that operates interstate to the laundry truck that delivers laundry in cities, to the passenger cars, if necessary. Compulsory orders of the last war may be revived again at some future time as the need arises. Some of these dealt with elimination of wasteful transportation with mileage reduction requirements, with special deliveries, with call-backs and the number of deliveries, with truck loading and unloading requirements, with establishment of delivery areas or routes, and with speed limits. Transit found itself making changes in connection with staggered hours, full use of all lines, turn-back service, standards of service in off-peak hours and charter buses among other things.

For the very same reasons for which such orders would be issued, principally conservation of scarce and critical materials, it would pay local transit, local cartage and automobile owners to think about adopting such conservation practices today even before they become mandatory. Conservation measures bring monetary savings, too, a consideration of increasing importance in these times of rising costs.

Parking Garage—Bomb Shelters

Automobile parking is one of the biggest urban traffic problems of the Nation. This last year has seen an unusual amount of activity in planning and construction of parking garages, war or no war, and it seems inevitable that materials restrictions will begin to hamper this type of construction from now on. Then again, spiraling costs are making their effect known in complicating the difficult financing problem. Now the idea has entered the picture of tying in the off-street parking program with an air raid shelter civilian defense program, and on every hand we hear talk

of combined parking garage-bomb shelters. City officials in New York; Kansas City; Pittsburgh; Chicago; Nashville, Tennessee; Springfield, Massachusetts, and many other cities are thinking seriously along these lines. Governor Driscoll of New Jersey has recommended to his legislature the creation of a special authority to construct underground parking garages that would double as air raid shelters. A proposed underground garage beneath the Boston Commons will reportedly serve double duty and the structural design has been altered accordingly. A contract for construction of a $5 million parking garage under Pershing Square in Los Angeles has been awarded, and designation of this structure as a possible bomb shelter is expected to eliminate difficulty in obtaining materials.

Interest in such multiple-use structures hinges on three points: (1) the service that would be rendered a community in time of disaster, (2) the priority or assistance which might be obtained in procuring construction materials, and (3) possible federal-aid assistance. As to the first point, there have been grave doubts raised as to whether such a building would be of service in an emergency. Although location and general over-all features of parking garages are very similar to shelter requirements, there are some major questions to be answered before we can be assured that such structures would actually be effective as shelters. For instance, how much warning of an air raid will be provided? The design of entrance facilities depends on this question. A ten-minute warning might result in pandemonium at the entrances to conventional garages, with thousands of people trying to rush into them at once (the British are reported to recommend one foot of door width for every 50 people expected to use the shelter.) Also the idea of concentrating people in shelters, in direct contrast to the principle of dispersal, is open to question. It might be better for people to take refuge in the safest spots within their own or adjacent buildings rather than for them to run through the streets to a single concentration point where a panic or single bomb could wipe out a great number of them. As yet we have no authoritative word as to whether there will be any warning at all, or if there will, what the time interval will be.

There may be some advantage in the future to incorporating shelter provisions in a building from a standpoint of obtaining priorities on construction materials. Apparently the Department of Commerce will be the claimant agency in this case. However, as yet no machinery has been established to assure such priority.

Application for authority to construct parking garages must be made with a regional office of the Department of Commerce. The incorporation or lack of incorporation of shelter provisions would seem to have little bearing on approval of such application.

It is likely that under the existing Civil Defense Act which became law early this year very little federal aid will be provided in paying for parking garage-bomb shelters. This act modifies existing law to permit the Reconstruction Finance Corporation to grant loans for construction of such buildings with a maturity period of 50 years instead of 40 years as contained under previous legislation. In at least one case it was found that it was cheaper to finance through the local banks than to go through RFC. In any event, this would not involve a contribution of federal money but only a loan which has to be paid back. Another section of the Civil Defense Act provides for federal financial contributions to the States for shelters on a matching basis. (It is to be noted here that no money has actually been appropriated as yet.) Where the facility is a joint-use building, federal aid would be applicable only to that portion of the construction or renovation which was being made for civil defense purposes. Since the federal assistance is only half of the total cost and since it is limited only to the extra work done such as strengthening walls and roof, providing auxiliary electrical supply plants, radiation filters for the ventilation system, and similar features, the portion of the total cost to be thus financed will not be great. It is reported that the proposed Boston Commons underground garage-bomb shelter will require about 10 per cent additional expense for conversion as a joint-use facility and that the proposed Kansas City garage-shelter will cost 18 per cent additional cost for this purpose. If these are typical figures, then the federal aid portion would be only 5 to 10 per cent of the total cost. This would not give much encouragement to those who might hope that the federal government would pay a major portion of the cost for joint-use facilities.

Another complicating consideration is the fact that the ground floor and basement in above-ground parking garages would be most suitable for air raid shelters, being most accessible and providing the greatest cover from above. However, these floors in the case of parking garages, are generally the most valuable and, in some cases, are leased out to concessionaires for stores or specialty shops. Although this area might be leased by the state and kept open for potential use as a shelter, this would certainly detract from the utility of the garage.

It would appear from these considerations that we had better proceed pretty slowly on the idea of erecting parking garage-bomb shelters until more is known about the subject. A more practical approach might be to plan shelter areas in existing buildings, particularly basements.

The Federal Civil Defense Administration, besides being concerned with shelters, is getting another program under way which will bear directly on urban transportation and traffic engineering. This work will involve planning for traffic control under disaster conditions such as air raids and is currently under direction of Hugh M. Beshers, Acting Director, Department of Engineering Service, Federal Civil Defense Administration.

Summary

Adding all the pieces of the picture together, it is beginning to appear that urban transportation will have to take several hitches in its belt and forget some of the grandoise plans for construction of new expressways, parking terminals and the like. It will be subject to more controls from the federal government and possibly compulsory conservation measures soon. Urban transportation officials and local businessmen should be prepared for this shift in thinking, and it would be of benefit to all concerned if voluntary conservation measures were begun now to make better use of today's streets and vehicles.

Sweden Strives to Modernize Bridges

Sweden is engaged in a program of replacing older bridges with modern ones. Roads in the country are generally good, with the exception of those on the Norwegian frontier. A high percentage of the roads in Sweden are gravel surface.

Traffic Planning For A Small Town

By Francis Dodd McHugh
Community and Regional Development Consultant, New York, N. Y.

PRINCETON, N. J., is renowned, among other things, for the University and the unique character of the community. Visitors find, when there is a football game at Palmer Stadium, traffic is congested and parking a vexing problem. However, events at Palmer Stadium have little to do with the normal daily flow of vehicles into the Borough of Princeton and the search for a place to park in the downtown business area. The volume of through traffic on local streets, and the growing demand for parking space to accommodate workers, customers, business and professional people created serious problems prior to 1948.

Hence, the Borough Planning Board, under the chairmanship of Alan W. Carrick, was asked to give its early attention to traffic and parking. The traffic and parking work outlined below was done as an integral part of the Board's comprehensive planning program which commenced in 1948 with the author as consultant.

Traffic and Highway Study

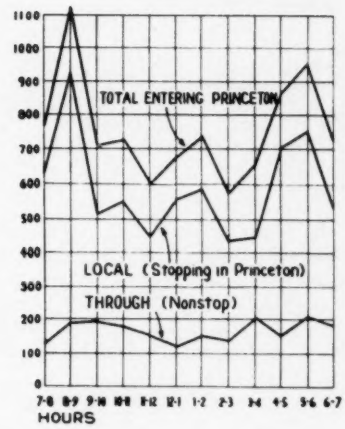
In accordance with the thought of the Planning Board that planning for the Borough should be a community function, arrangements were made for the sponsorship of a traffic survey by the Princeton Civic Association. The field survey, as well as related statistical work, was undertaken by Opinion Research Corporation as a voluntary service to the community. State Highway and Mercer County agencies, as well as Borough Police and the Engineering Department participated in the field work. It was the author's job to analyze the data and come up with the answers.

The principal purpose of the traffic survey was to ascertain the volume, origin and destination of highway traffic entering Princeton on a normal week day, while the University and other educational institutions were in session. The survey was conducted on Tuesday, May 18, 1950. Automatic counters at eight major stations indicated that, during a 24-hour day, incoming traffic totaled 13,200 vehicles. (The Borough's 1950 resident population is only 9,410 people and Princeton students are not allowed to have cars.) Hand counters at the same stations revealed a total of 9,200 vehicles entering the Borough between 7 A.M. and 7 P.M.

Every fifth vehicle entering at the eight stations between 7 A.M. and 7 P.M. was stopped and the driver interviewed according to a questionnaire, which was prepared in consultation with the writer. About 1845 personal interviews were conducted, at an average of one and a half minutes each, without seriously interfering with traffic flow. Because of the close agreement found between the sample count, as inflated, and the hand-meter count, the inflated sample figures were used in analysis of data. The probable limits of error due to the size of the sample were such that the taking of additional cases would not have altered the conclusions to be drawn from the findings.

CHART A

TRAFFIC ENTERING PRINCETON BY HOUR OF DAY

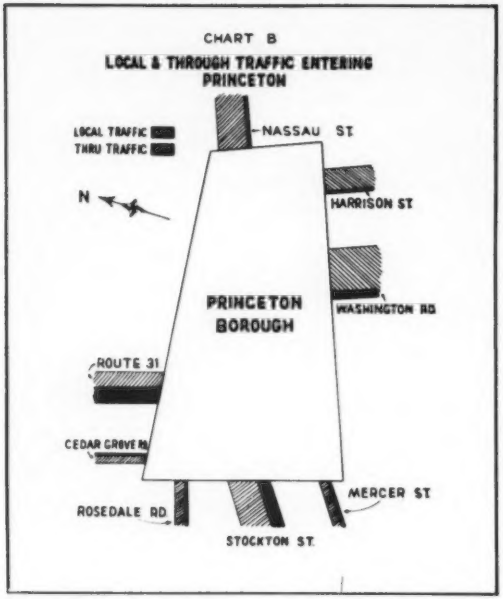


Total and Through Traffic

The survey indicates that, during a 24-hour normal week day, approximately 22 percent of the vehicles entering the Borough constitute through traffic. Of the total traffic, heavy trucks (over 3 tons) account for only 4.6%, light trucks (under 3 tons) amount to 12%, passenger cars represent 82%, and buses about 1%. Only a fifth of all passenger cars are through traffic, but 54% of heavy trucks and 16% of light trucks do not stop in Princeton. (Buses, assumed to be stopping, were counted as local traffic.) Through traffic consisted of 80% passenger cars, 11.4% heavy trucks, and 8.6% light trucks.

Hourly Variation

Chart A shows the volume of traffic at various times of the day, between 7 A.M. and 7 P.M. The "peak hours" are 8-9 A.M. and 4-6 P.M. The volume of through, non-stop traffic is fairly regular during this period. Therefore, local traffic produces the peaks and contributes to the parking problem. Since the survey stations were at or beyond Borough limits, vehicles originating within these points and destined for Princeton were not covered (see Map I.) Hence, the separate parking survey, which is discussed later.



Traffic Volume and Routes

Chart B shows traffic volume and distinguishes between local and through traffic at the eight major points of entry. Washington Road carries nearly a quarter of all traffic; Stockton about a fifth; Nassau about 16%, and Route 31 about 15%.

Route 31 is the only highway with more non-stop than local traffic; at the other stations local traffic predominates. The survey showed that two routes carry two-thirds of all through traffic, namely: (1) Route 31 and Stockton and Mercer Streets; and (2) between Route 31 and Washington Road and Harrison Street (Chart C). Practically all of the traffic on the two major through routes originates more than one mile outside of Princeton and, therefore, could be diverted from local streets. A single by-pass route could materially reduce the volume of through traffic on local streets and reduce travel time for through traffic as well.

A Master Plan of Highways

After consideration of the findings of the traffic survey, of streets and traffic flow within the Borough, a highway plan was prepared, which was carefully studied by the Planning Board. When a consensus was reached, the plan was informally discussed with Princeton Township and Mercer County Planning Boards as well as with representatives of the University and officials of the neighboring municipalities. Thereafter, the Borough Planning Board adopted, as a part of its master plan, a system of existing and proposed highways and major streets which will provide adequate facilities for traffic, both local and non-stop (see Master Plan of Major Streets, Approach and By-Pass Roads).

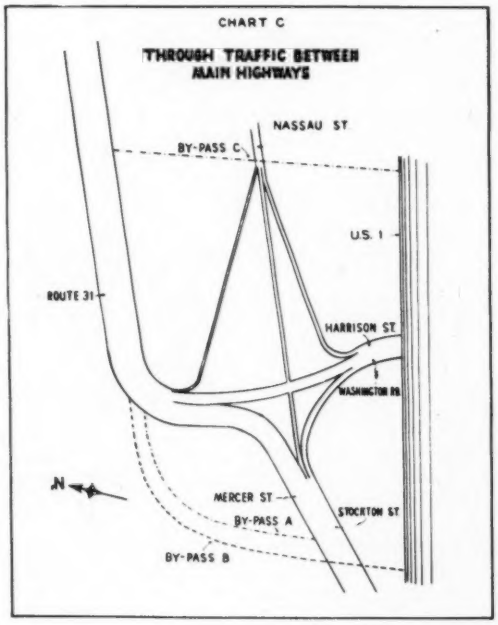
The location of proposed routes on the Master Plan is schematic; exact locations will be determined by final mapping based on field surveys and approvals by appropriate agencies. In the case of routes outside the Borough, final mapping will be done by the affected municipality, the County or State, depending upon the type of highway to be built. The Borough plan provides a general guide to necessary and desirable highway improvements, which can be realized to the mutual benefit of all concerned and in an orderly way as funds become available.

Proposed Major By-Pass

The major by-pass route shown on the Master Plan is considered to be the most effective, economical and desirable route for non-stop traffic. Generally this route coincides with portions of routes already shown on proposed Mercer County Master Plan and on State Highway route plans.

It is estimated that this proposed major by-pass would divert three-quarters of all through traffic now passing through Princeton Borough. However, to be fully effective, this route will require changes in road markers at a traffic circle just northeast of Trenton, so that traffic proceeding from Trenton to Somerville would be directed along U. S. Route 1 as far as the new traffic circle northeast of Millstone River and thence along the proposed by-pass to Route 31 near Rocky Hill Village north of Princeton. This remarking would avoid present routing of non-stop traffic through Lawrenceville and Princeton. Corresponding changes would be required in re-routing traffic from the north to the south and east.

In connection with through traffic, it is noteworthy that the U. S. Bureau of Public Roads anticipates that by 1970 highway traffic volume in this part of the nation will increase 50% and that truck traffic will double. On the basis of the traffic survey figures, these anticipated increases indicate that, on a normal week day of 24 hours in 1970, the proposed by-pass would divert a total of some 3,400 vehicles (of which 1,200 will be trucks) from the local streets of Princeton.



Proposed Secondary By-Passes

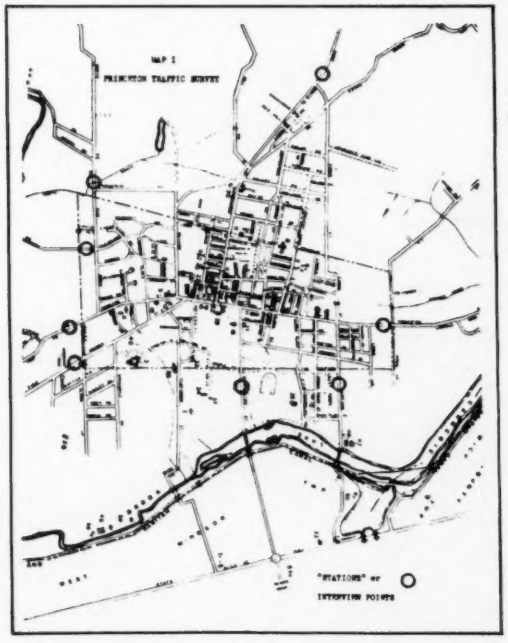
A secondary by-pass route located north of the Borough, and running in an east-west direction, is shown on the Plan. This route would help to "open" Princeton. Perhaps, as much as 6 to 8% of through traffic might thus by-pass Nassau Street and, in addition, such local traffic as is not destined for the downtown business area.

Major Streets

The Master Plan also shows major streets, existing and proposed, which will facilitate the convenient distribution of vehicles to all parts of the community. Only two of these major street routes need be mentioned here.

One group of major streets, which would function as "spreaders" in the secondary by-pass system, is proposed south of Carnegie Lake. The purpose of these "spreaders" is twofold: (1) to divert north-south traffic from Washington Road (which bisects the University Campus and now carries the heaviest traffic volume to the already congested downtown area) before the proposed major by-pass can be built; and (2) eventually to divert local traffic, from Washington Road and the center of town, by serving as a distributor of traffic both to the east and west.

At present Nassau Street is the only public street running uninterruptedly east-west within the Borough. (The existing major street, shown on the Plan south of and roughly parallel to Nassau Street, is a private road, mostly on University property.) North of Nassau Street there are existing parts of an east-west parallel route, but there are two missing links; one between Bayard Lane (Route 31) and John Street on the west, and the other to Snowden Lane on the east. The Plan proposal is that these missing links be opened by the Borough in the interest of public safety, before additional building can add further complications and obstructions to this badly needed east-west parallel route.



Intersectional Treatment

The Plan shows by means of circular symbols several intersections which require detailed study, at the time of mapping, in order to provide the safest traffic flow. Such intersections are shown on the major by-pass route as well as on the secondary by-pass and major street routes.

It is believed that the Master Plan will adequately provide for normal daily local and through traffic, both as now existing and as anticipated in future. Such infrequent peaks as are due to football games will also be facilitated by the proposed routes and connections. When carried out, the proposals shown on the Plan will facilitate convenient distribution of vehicles to all parts of the community, relieve congestion at the center; and by diverting through traffic in good volume via by-pass routes, will promote public safety and general welfare.

Vehicular Parking

While the proposed highway improvements will promote the flow of normal daily traffic, and will permit freer movement during peak periods, there is the pressing problem of vehicles at rest—namely, the parking problem.

In Princeton most people expect to find space at the curb directly in front of the place to which they wish to go for business, shopping and the like. With present traffic volume and limited curb space, such accommodation is impossible and, in the case of most businesses, only a small percentage of customers can have such convenience.

In the Traffic Survey information was obtained on driving habits of people entering the Borough. Briefly, this Survey found:

1. A high proportion of drivers stopping in Princeton plan to park for long intervals; this is especially true early in the day.
2. Among drivers stopping in Princeton, the most common reason for their trip is going to or returning from work. The high frequency of such trips early in the day is another indication of long-term parking.
3. One driver in five seeks to park in a parking lot. The proportion is even higher early in the day, which suggests that parking lots are well utilized when there is space available in them.
4. Curb parking is heaviest in the congested downtown area. Moreover, many drivers plan to park in that area for a longer time than the legal limit of one hour, confirming the seriousness of the enforcement problem.
5. The findings suggest that, insofar as is feasible, the best solution would be the provision of more off-street parking facilities in areas where drivers now seek to park.
6. Of all vehicles entering the Borough, about 17% were destined for the University campus.

The Parking Survey

The Traffic Survey could not turn up all the facts necessary to a solution of the parking problem. Hence, a parking survey of the downtown area was undertaken in June 1948. Like the traffic survey, the parking survey was a community activity. Students of Princeton High School volunteered to interview each driver parking at the curb and in off-street lots between 9 A.M. and 5:30 P.M. The questionnaire was a card form (note sample illustrated) arranged so that questions could be quickly checked in less than a minute. Educational Testing Corporation voluntarily processed the data as a community service. The State Motor Vehicular Department cooperated in the field work, and the Borough Engineering Department supervised the field workers and assisted in processing field reports.

BOROUGH OF PRINCETON, N.J.
PLANNING BOARD
MASTER PLAN OF MAJOR STREETS,
APPROACH AND BY-PASS ROADS
EXISTING
PROPOSED
MAJOR HIGHWAYS
SECONDARY HIGHWAYS
MAJOR STREETS
INTERSECTIONS REQUIRING
SPECIAL TREATMENT

Findings on Parking

Readers of *Traffic Engineering* will not be surprised that most of the findings on driving habits and parking demand in Princeton approximate experience in communities of similar size in other parts of the country. The differences are important and it was the need for facts on such variations which prompted the survey. In a community of lively intellectual activity and civic consciousness, the facts on local conditions are prerequisite to the definition of a prolem of public interest, as well as to evaluation of the merits of a solution.

The findings, which were included in the report to the Planning Board, are summarized as follows:

1. A total of 4,165 vehicles were covered in the survey. 2.47% of all parkers drove to work or for business reasons, 64% of all vehicles made one or more trips daily and parked downtown on each trip, and only 41% of all drivers were Borough residents (25% came from the Township, and 15% from places beyond the Township but within a 5-mile radius of the center of the Borough).

2. The purpose and frequency of trip (exclusive of the University campus which was not surveyed because of its separate parking facilities) as well as the origin of vehicles parking downtown daily, clearly indicate that Princeton is a center for business people, shoppers and office workers living within a radius of 10 miles and more of the Borough's hub. (This fact is confirmed by a separate study of economic activity.)

3. For all vehicles the peak hour was 5 P.M., when 22% of total vehicles parked daily seek parking space downtown.

4. Peak hour "demand" included vehicles on adjacent streets. (Within the limitations of the field force, it was not possible to include stations on streets adjacent to the business area. However, it was local knowledge that daily parking on these streets, for periods in excess of the legal limit, was common practice. Therefore, counts were made of such cars and of curb space used, but no interviews were attempted.) When supply is compared with demand, it was noted that at peak hour 179 vehicles were double parked or in spaces reserved for crosswalks, taxis or other special purposes. Last but not least, over 300 additional off-street parking spaces were indicated adequately to handle the peak hour demand.

5. 17.6% of all vehicles used 58% of total car hours between 9 A.M. and 5:30 P.M. 6. 88% of vehicles at the curb parked under one hour and used two-thirds of car-space hours, and 71% of cars off-street parked over 2 hours and used nearly 94% of car-space hours.

Scheduling

It should be mentioned that, due to conditions beyond its control, Educational Testing Corporation had to defer from time to time its voluntary card punching and tabulation of parking data. It was late Fall of 1948 when the statistics were available and, unfortunately, the resulting delay in analysis of data lead to some unscheduled results.

There was harmony within the municipal administration. Two members of the governing body were on the Planning Board and attended meetings at which progress on current work was reviewed. Before the Planning Board could reach considered recommendations on parking, the governing body jumped the gun and introduced a general ordinance for curb metering. At the public hearing considerable opposition developed with demands for a thorough study. A citizen's parking committee was formed by the opposition to "get the facts."

To be sure, the Planning Board's studies had been publicized, including numerous newspaper items relating to both the traffic and parking surveys. But, that is another story! After the opposition formed, the governing body deferred action on its proposed metering ordinance and referred the whole matter to the Planning Board for investigation and report by the end of 1949.

Now the Planning Board had to concentrate its main effort on educating the public, and the consultant was directed to undertake an extensive study of the downtown area. Originally, this study was intended as a part of a future land use plan, which is to make provision for all types of activities both present and anticipated future. The Board's educational effort centered on a booklet which, upon publication, was widely circulated in Princeton. The booklet (entitled "Report to the Planning Board on the Parking Problem and Recommended Solution," by the Sub-Committee on Parking, Princeton, Nov. 1, 1949) outlines the problem, the methods used elsewhere to solve the problem, and the financial and legal aspects with particular reference to New Jersey law. Also, it contains recommendations for a rounded parking program, including: metering of curb space, acquisition of off-street lots to insure permanent parking space in the heavily built downtown area, and zoning proposals for off-street parking and loading in new traffic generating types of building.

This booklet was instrumental in selling the public, particularly merchants, organizations and the citizens' parking committee. A series of news releases and talks to civic groups completed the educational program by the Spring of 1950.

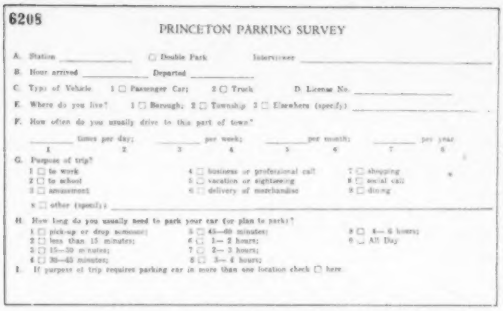
Then the technical planning work was completed and the Planning Board reported back to the governing body with explicit recommendations. Thereafter, in June 1950, the governing body enacted an ordinance to regulate by curb metering the parking of vehicles on certain streets, according to time limits recommended by the Planning Board. By September 1950 the curb meters were installed and in operation. Generally meters have been satisfactory; there is curb space in the right places for the short-term parker, and there is evidence that, with the initial adjustments about over, meters will continue to operate as intended.

Balance of Current Program

Curb metering is only one phase of the current program. Permanent off-street parking facilities and zoning provisions also are involved, and the program is moving forward. It ought to be mentioned that none of the existing off-street lots are permanent; some are "loaned" to the Borough for parking with provision for cancellation of the lease by the owner upon 30 days' notice; others are operated by business interests. But parking spaces on "vacant land" and in interior block locations have a disconcerting way of dissolving under a new building and thus adding to an already acute parking problem in Princeton.

In embarking on curb metering, the governing body announced that off-street parking lots were to be acquired as rapidly as possible. Negotiations have begun for acquisition by the Borough of interior block locations, strategically situated to serve the congested business area.

The parking program will commence, at least, on the basis of metering both curb and municipally owned off-



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PRINCETON PARKING SURVEY

A. Station _____ ☐ Double Park Interviewer _____

B. Hour arrived _____ Departed _____

C. Type of Vehicle 1 ☐ Passenger Car; 2 ☐ Truck D. License No. _____

E. Where do you live? 1 ☐ Borough; 2 ☐ Township; 3 ☐ Elsewhere (specify) _____

F. How often do you usually drive to this part of town?

_____ times per day; _____ per week; _____ per month; _____ per year

1 2 3 4 5 6 7 8

G. Purpose of trip?

1 ☐ to work 4 ☐ business or professional call 7 ☐ shopping

2 ☐ to school 5 ☐ vacation or sightseeing 8 ☐ social call

3 ☐ amusement 6 ☐ delivery of merchandise 9 ☐ dining

x ☐ other (specify) _____

H. How long do you usually need to park your car (or plan to park)?

1 ☐ pick-up or drop someone; 5 ☐ 45—60 minutes; 9 ☐ 8— 8 hours;

2 ☐ less than 15 minutes; 6 ☐ 1— 2 hours; 0 ☐ All Day

3 ☐ 15—30 minutes; 7 ☐ 2— 3 hours;

4 ☐ 30—45 minutes; 8 ☐ 3— 4 hours;

I. If purpose of trip requires parking car in more than one location check ☐ here.

street lots to insure proper functioning of prime parking locations. Incidentally, it is estimated that, with relatively high acquisition costs but at modest parking fees, metering income will be sufficient to finance the capital and operating costs of the entire program, including additional police.

Plan for the Future

A proposed new zoning ordinance has been drafted by the author and is being studied by the Planning Board preparatory to recommendations to the governing body. This ordinance contains requirements for off-street parking and loading in connection with various types of new buildings and according to their anticipated traffic generating capacities. Actually, the new ordinance was designed to give effect to a master plan for the physical development of the Borough. That portion of the Plan relating to the downtown area and parking is outlined below.

The plan for future development of the downtown area derives from a number of considerations, including present and anticipated population in the Princeton community; resulting professional and commercial activities in the business area; and buildings and various types of land uses needed to accommodate the expanded activity now expected in future. The plan is designed to meet requirements in the Downtown Area by 1970.

The scheme proposes certain street improvements, which would open up the business center and, together with the prohibition of curb parking on narrower "interior" streets, provide for free flow of traffic. (It is recommended that, after provision of off-street lots, curb parking on residential streets adjacent to the business area be restricted to residents of these streets.)

Off-Street Parking

The six parking lots designated by the plan are now in use and should be retained to park a total of 434 vehicles. Five additional lots are proposed to be acquired by the Borough to park a total of 507 cars. Lot capacities are based on a minimum average of 300 sq. ft. gross area per vehicle.

Many of the off-street parking areas designated on the plan are proposed to be provided by owners as their property is changed to business use, in accord with the revised zoning. The location and size of these areas are schematic. Details necessarily are left to actual plans for improvement of each property. While the revised zoning would require such private off-street space for new business buildings, no such areas are shown on the plan for blocks in the more congested section.

In making this general plan, it was contemplated that, as space for business expansion is needed, existing residence and vacant land in the Downtown Area will be put to more intensive uses, principally commercial and joint occupancy. The subsequent detailing of the general plan should indicate suitable sections for various types of activity to be accommodated. And as the need is demonstrated, the present boundaries of the business zone can be extended.

By-Passes Said to Help Local Business

A survey by the Chamber of Commerce of the United States reveals that highway by-passes have helped, not hurt, local business, in the opinion of businessmen in a majority of thirty communities included in the survey.

Surveys results are published in a booklet, "Do By-Passes Hurt Business?" The study was undertaken following enactment of a new federal law requiring states to hold local hearings when planning to by-pass cities with federal-aid state highways.

The sentiment of local businessmen is summarized thus: "When the idea is first suggested, many oppose it. However, after the by-pass has been in operation for a while, all or most of the established merchants and businessmen usually praise it."

The new federal law is incorporated in the 1950 Federal-Aid Highway Act which requires state highway departments to hear publicly the local townspeople affected by any proposed state highway by-pass on the federal-aid system. "This means," the booklet says, "that many hearings will take place in the future where businessmen and others can make their views known regarding by-pass projects.

A sample check of 12 state highway departments revealed that whereas six now customarily hold local hearings on such projects and so would automatically comply with the new law, six others do not now follow this procedure but reported that they would begin to do so.

The booklet points out the prerequisites that make a by-pass desirable in some cities and undesirable in others. Facts are cited to support the contention that business and property may be benefited following installation of a by-pass. Desirable by-pass design features are discussed, and suggested actions given for local businessmen who fear adverse effects of a contemplated by-pass.

Experienced Drivers Have Many Accidents, Two Studies Show

Minnesota and Oklahoma concluded studies recently which indicate that long experience in driving is no assurance against accidents.

Records of 59,121 drivers whose experience was known and who were involved in accidents in Minnesota during 1949 were studied by the Minnesota Highway Department, and it was found that 61 per cent had been driving more than ten years; 21 per cent from six to ten years; and 17 per cent from one to five years. Less than 1 per cent had been driving less than a year.

In Oklahoma last year, 45 per cent of the drivers involved in accidents had been driving eleven years or more. Further, drivers with five or more years' experience accounted for 407 of the 518 traffic deaths in Oklahoma in 1949.

AAMVA Bulletin

Passing Practices At No-Passing Zones

By Burt Whedon (Jun. Mem., ITE)*
Associate Engineer, Nebraska Department of Roads and Irrigation

THIS study was prompted by an interest in determining a rational method for marking no-passing zones on two-lane highways in sections of restricted sight distance. The AASHO policy covering such zones is arrived at by taking the design minimum passing sight distance and modifying it so as to not unduly restrict the use of the highway. We agreed with AASHO that such a modification is necessary but wanted to base this modification on actual passing practices in the area of restricted sight distance, such as approaches to vertical and horizontal curves.

Our theory was that since most drivers are good drivers, their practices would be the best basis for marking no-passing zones. We hoped there would prove to be a practical minimum sight distance below which few drivers would attempt to pass. This seemed to us to be the logical minimum passing sight distance which should be used as a basis for marking no-passing zones.

One might raise the point that if we were going to find out what the drivers were doing and mark the highway accordingly that we perhaps might not mark the highway at all. And indeed this may very well be true. But it has been found in almost all phases of traffic engineering that regulations are not going to change the drivers' habits, except as they indicate rational practice. So, if we are going to mark no-passing zones we had just as well make them fit the drivers' habits or else the drivers will most likely ignore them.

A study of this nature could involve a lot of work. To do a really complete job we would have to measure passing practices where sight distance is restricted on highways of different design speeds and also measure the effect of marked no-passing zones of different lengths. In order to cut the study down to a reasonable size we decided to confine the work to analyzing passing practices on one type of road with restricted sight distance but without no-passing zones marked.

Location

First of all we wanted to study a location on a high speed highway. Additionally, we needed a location with a heavy traffic volume so that it wouldn't take too many hours to get the necessary field observations. Also, we needed a location where the observer could get high enough above the roadway that he could get a good perspective of operations on the highway.

A stretch of roadway that filled the requirements was found on the Wilbur Cross Highway northeast of Hartford, Connecticut. Figure 1 shows one of the locations selected on the Wilbur Cross Highway. It is a two-lane road of Portland cement concrete 24 feet wide with eight foot bituminous shoulders. This road has a design speed of 70 miles per hour. High speeds were characteristic of this road even though there was a heavily-enforced 45 mile per hour speed limit. The average passenger car speed was about 50 miles per hour and roughly two per cent of the cars exceeded 70 miles per hour.

Fig. 1

Three locations were studied. The sight distance at Location Number 1 is restricted by a 1,700 foot vertical curve which the road approaches on a five per cent upgrade. The minimum passing sight distance approaching the crest of the hill is 750 feet. The maximum passing sight distance at the far end of the location is approximately 3,600 feet.

Location Number 2 is the same section of highway as Location Number 1. In this case, traffic moving in the opposite direction was considered. The sight distance is restricted here by a back slope of a cut on the inside of a three and one-half degree horizontal curve. The curve and the tangent approaching it are on a four per cent upgrade. Minimum passing sight distance is 630 feet and the maximum passing sight distance at the far end of the location is approximately 3,400 feet.

The sight distance at Location Number 3 is restricted by trees on the inside of a five degree horizontal curve. The curve and the tangent approaching it are on a two per cent downgrade. Minimum passing sight distance is 960 feet and the maximum is 1,600 feet.

Field Observations

Locations Number 1 and 2 were studied with the aid of a Cine-Kodak Special and attachments which provide for accurate time-spacing of frames on the film. The entire section was placed in the range of the telephoto lens. Passing maneuvers were photographed so it was possible to determine the points at which the passing maneuvers were begun and completed. Speeds of passed and passing vehicles were determined by measuring the distance traveled between successive frames on the film. Visual observation was used at Location Number 3 with 100 foot zones marked on the road. Over 500 passing maneuvers were observed at the three locations.

Mr. Whedon's article is third in the current series based on student research at the Yale Bureau of Highway Traffic during the year 1949-1950.

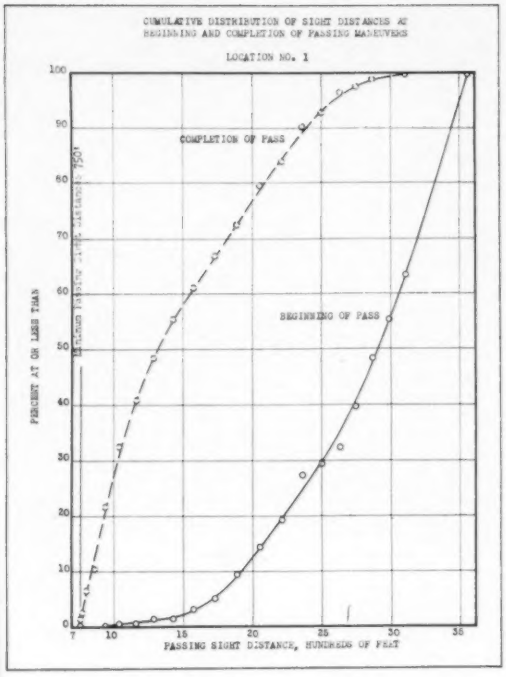
CUMULATIVE DISTRIBUTION OF SIGHT DISTANCES AT
BEGINNING AND COMPLETION OF PASSING MANEUVERS
LOCATION NO. 1
COMPLETION OF PASS
BEGINNING OF PASS
PERCENT AT OR LESS THAN
PASSING SIGHT DISTANCE, HUNDREDS OF FEET

Fig. 2

Results

In analyzing the data only those passing maneuvers which were begun with no opposing vehicles in view were considered. This was done because it was desired to measure only the effect of the restricted sight distance on passing practices. Presumably a driver who started to pass with an on-coming car in view would be governed by the position and speed of that car and not by the sight distance.

The most important results derived from the studies are shown in Figures 2 and 3. These curves show the per cent of vehicles beginning or completing a passing maneuver at any given sight distance or less. The curves for the beginning of the pass show a bend or knee which indicates the point where the per cent of vehicles beginning to pass is sharply reduced. This point, which we call the critical sight distance, is a sight distance below which proportionately few drivers will begin a passing maneuver. This critical sight distance is 1,700 feet for Location Number 1 and 1,200 feet for Location Number 2. The critical sight distance for Location Number 3 (figure not shown) is also about 1,200 feet. These last two are both horizontal curves, one on the upgrade and one on a downgrade.

Location Number 1 is at a vertical curve, which probably accounts for the greater critical sight distance. Drivers are not able to judge the sight distance as well on vertical curves as they can on horizontal curves, and hence they may be more cautious in passing. It would seem, therefore, that the performance of motorists at the horizontal curves is a better indication of where the no-passing zones should be marked because it represents the practice of motorists who are able to judge the sight distance more accurately.

The curves for the completion of passing maneuvers show that many passes are completed in the area very close to or including the minimum sight distance. It would appear that any type of regulation which would enjoin drivers to complete the passing maneuver before reaching the no-passing zone would unduly penalize traffic.

An investigation was made to discover whether passing maneuvers undertaken in areas where the sight distance was limited were essentially different than passing maneuvers on level tangent sections with unlimited sight distance. Results showed that, regarding speed differential between passed and passing vehicles and length of passing maneuver, there is very little difference between passing maneuvers in the area of restricted sight distance and those on level tangent sections, as found by other observers.

Restrictive Effect of No-Passing Zones

A no-passing zone of any given length will have a more restrictive effect on a road which has only short sections in which sight distance permits passing than on a road with long level tangent sections. In Figure 4 data from the study at Location Number 2 was expanded to show what the restrictive effect of the no-passing zone would be depending on the length of the level tangent section. For example, if the no-passing zone were marked where the sight distance was 1,200 feet or less, 20 per cent of the potential passes would be restricted in a section 2,000 feet long. The same no-passing zone would restrict only five per cent of passes in a section one mile long.

Figure 4 undoubtedly oversimplifies the situation a great deal and is of no particular value except to point out which

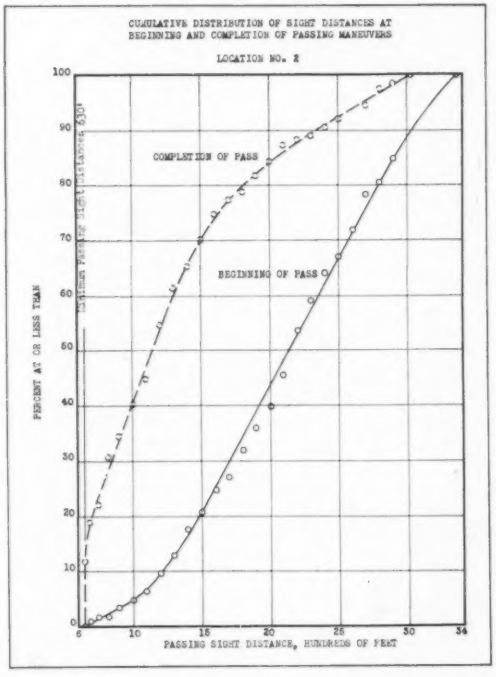
CUMULATIVE DISTRIBUTION OF SIGHT DISTANCES AT
BEGINNING AND COMPLETION OF PASSING MANEUVERS
LOCATION NO. 2
COMPLETION OF PASS
BEGINNING OF PASS
PERCENT AT OR LESS THAN
PASSING SIGHT DISTANCE, HUNDREDS OF FEET

Fig. 3

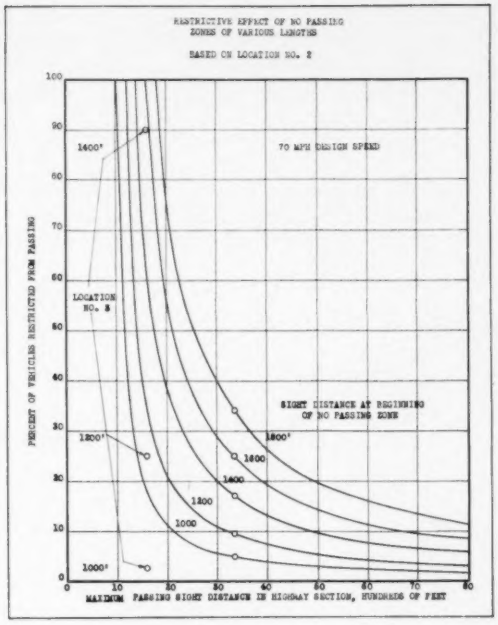

Fig. 4

direction the study might take should anyone have the necessary time, money, and curiosity. It does point out an inconsistency in the study. Three values from Location Number 3 are also plotted in Figure 4. These are for a shorter section of road and do not agree very closely with the values for Location Number 2.

Agreement With AASHO Policy

One set of observations such as those made in this study is certainly not an adequate basis for the drawing of positive conclusions. It would appear that for this particular highway at least, a no-passing zone which would not materially restrict the use of the highway could be marked where the sight distance is less than 1,200 feet at horizontal curves and 1,700 feet at vertical curves. If we agree that driver judgment of right distance is better at horizontal curves, than the 1,200 feet figure could be universally used on this highway.

The results confirm the judgment of the AASHO Committee in the suggestion that for highways having 70 mile per hour design speed, no-passing zones should be marked where the passing sight distance is less than 1,200 feet.

To complete this study we would need similar checks on highways having other design speeds, and also studies of the effect of marked no-passing zones on passing practices. We have only begun to get at the problem until we find out what effect, if any, these zones have on the drivers' habits.

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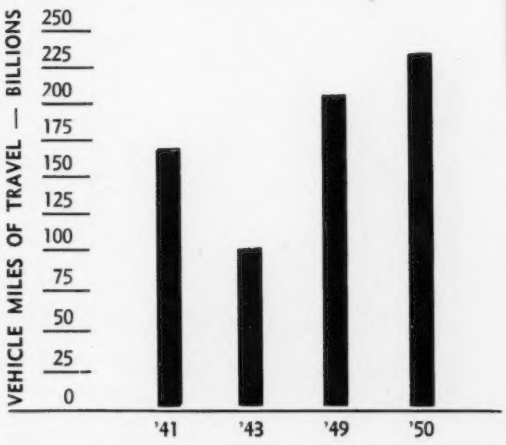
Traffic Trends



TRAVEL ON RURAL ROADS FOR THE TWELVE MONTHS of 1941, 1943, 1949 and 1950.

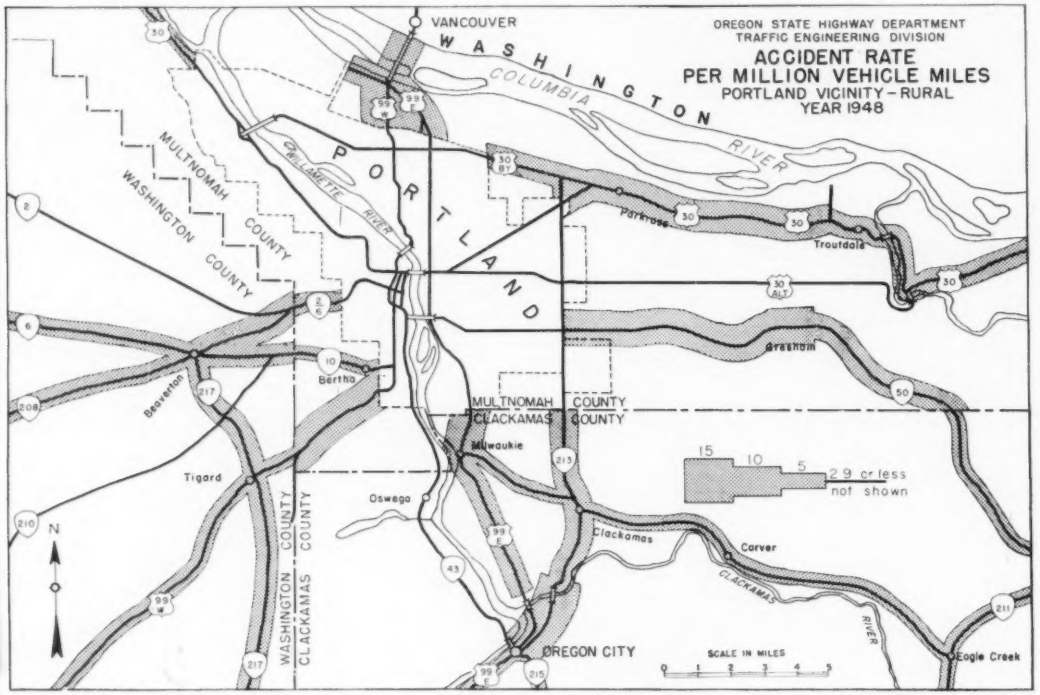
Based on Bureau of Public Roads Data

Reference Notes

By F. B. Crandall (Mem., ITE)
Traffic Engineer
State Highway Department
Salem, Oregon

Accident Rate Flow Map

When Technical Report No. 50-2 of the Oregon State Highway Department, entitled "1948 Traffic Accidents and Accident Rates on the State Highways," was prepared, under the supervision of F. B. Crandall, Traffic Engineer, a novel method of illustrating the accident rate per million vehicle miles was devised. The flow map illustrated below is one segment of the complete state map but it effectively illustrates the use of a flow diagram to depict the accident rate. This flow map is a compilation of other illustrations in the report which depicted traffic flow and the rate of accidents per mile. The average accident rate per million vehicle miles for all rural state highways is 5.17. The rate per million vehicle miles for the Rural Primary System is 5.18 and for the Rural Secondary System it is 5.15.



Conservation Order Limits U. S. Auto Replacement

The General Services Administration has set up a list of 11 critical materials and ordered Government agencies to conserve them. The order also applies to purchases of motor vehicles, typewriters, steel filing cabinets and other equipment using critical materials.

The order listed as "critical materials at this time" aluminum, cement, copper, lead, leather, lumber, paper, rubber (synthetic, natural or in combination), steel, wool and zinc.

Under terms of the order Government-owned passenger vehicles may not be replaced until they have 60,000 miles or six years' use and standard trucks of one and a half tons or less must have 50,000 miles or six years of use. If the vehicles are part of a fleet of eight or more, no more than 25 per cent may be replaced in any one fiscal year. Motor trucks of more than one and a half tons, construction equipment, earth-moving equipment and office machinery are to be replaced only when repair costs are so great that continued operation becomes uneconomical.

Jess Larson, administrator of General Services, said agencies have "heavily replaced" automobiles since the end of World War II. For this reason there should be a sharp reduction in motor vehicle purchases by the Government, he said.

TRAFFIC NEWS

Quincy, Massachusetts, Finds the Answer

By Deane Dana

A 1940 geographical dictionary describes this city as a shipbuilding and granite quarrying center about eight miles south of Boston. This Atlas may well add in its 1950 edition, "the fastest growing retail shopping area in New England."

Quincy is fast becoming the shopping center for the "South Shore" and for communities from the North, South and West. This has come about through the combination of efforts of a progressive minded city administration and alert and active civic organizations. Excellent engineering consultant work and installation of parking meters and lighting equipment contributed to the success of the development.

Photo by L. H. Whittaker, Jr. Quincy Patriot Ledger

Situated as it is on the main south shore traffic routes with its 1950 population approximately 84,000, Quincy found its traffic and parking problem increasing by leaps and bounds after World War II. The city was originally founded as a trading post in 1625, and the location of its streets and roads "just happened." This lack of uniformity in layout further complicated the traffic situation. It so happened, that in the rear of the business blocks on the West side of Hancock Street in the central business section, there existed an unsightly and undeveloped tract of land.

Mr. Charles R. Herbert, Commissioner of Public Works, with possible utilization of this vacant land in mind, started his comprehensive planning toward the solution of Quincy's traffic and parking ills.

The first step in the program was directed toward immediately easing the curb parking situation by eliminating long time stops in the busy central area. On August 2, 1948, this was accomplished with an installation of 343 Dual Parking Meters.[1] Most of these meters provided for up to one hour limit for five pennies or a nickel; a few, in areas not so critical, allowed two hour stops for ten pennies or two nickels. This installation forced the long-time and all-day parker out of the business district and greatly increased the turnover at the curb. On February 1, 1949, about 200 additional meters were put into operation at the curb, not only in the central business district, but in one of Quincy's two-fringe neighborhood shopping areas.

In the meantime, aided in no small way by the local civic organizations, led by Mr. Alexander Purdon, Executive Vice-President of the Chamber of Commerce, the city undertook to acquire and prepare the "eyesore" vacant land West of Hancock Street. So far, the program had not involved any financial consideration as the curb meters had been installed on the usual sharing of receipts basis. Now the city was faced with a substantial outlay of cash. Massachusetts is not one of the six states where revenue bonds are legal to provide money for such purposes; therefore, the money had to be appropriated. Active promotion by the civic organizations for the project encouraged the city to go ahead with the development.

The consulting engineering firm, Philcot Corporation, was engaged to design and engineer the project and soon the Walter Reed Corporation of Boston had the filling and construction work under way. Five hundred and thirty-three Dual, two-nickel, two-hour and five-penny or one-nickel, one-hour meters were installed on the lot and mercury-vapor lamps mounted on Union Metal poles[2] provided for 24-hour-a-day operation of this, the largest municipally owned and operated metered parking facility in New England. Official operation started February 1, 1950.

The lot has now been in operation one year. During this short time, the transformation of the immediate area is almost unbelievable. All of the abutting area stores have built new fronts on the rear of their establishments and the area is consequently surrounded by

[1]Manufactured by Dual Parking Meter Company, Canton, Ohio.

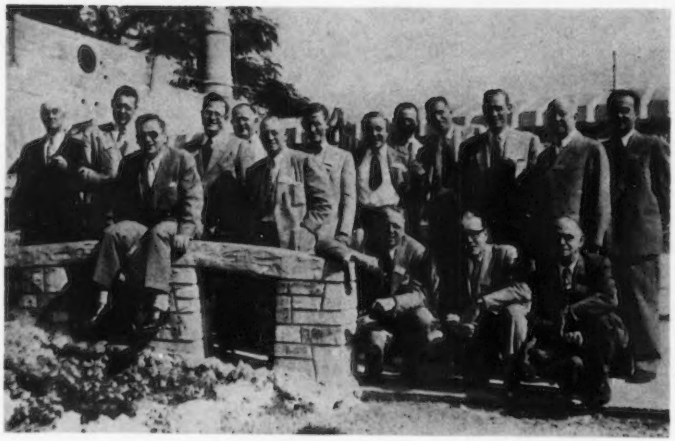
[2]Manufactured by Union Metal Manufacturing Co., Canton, Ohio.

fine modern appearing buildings. In addition, two modern business blocks are nearing completion. The accompanying picture of night use of the lot, taken a few weeks ago, gives a clear indication of the business being attracted to this locality by the availability of adequate and handy parking space. This ease of parking has attracted shoppers from near and far as evidenced by reports of the Merchant's Bureau that delivery routes have had to be extended.

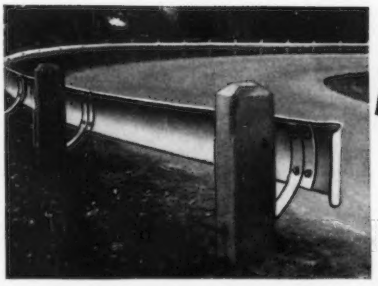
The city administration has taken the operation of the project in stride. Three departments are concerned with the details. The Treasurer's office handles the collection and accounting of the meter receipts. This sum is substantial, totaling from the first of the year to October 11, 1950, $66,551.15. Breaking this down, 508 curb meters yielded $32,684.78 from January 1st to October 11th, and 533 lot meters yielded $33,866.37 from February 1st to October 11th, 1950. The Treasurer's office cost for this work is shown as $2,110.00. The Police Department is concerned with enforcement, for which it received $2,500.00. Maintenance and repair of meters and care of the lot are the responsibility of the city's Public Works Department. When asked about snow removal and cleaning of the lot, they indicated that this is handled right along with the street clearance. The Public Works Department has charged meter receipts $6,759.57, of which $6,044.60 represents salaries. Repair and maintenance have been negligible. Some of the labor, however, went toward relocation of meters as efforts are made to perfect the traffic flow on the streets by trial of new parking and flow patterns. One additional charge appears from this department, $861.85 for secondary landscaping work at the lot.

As can be seen from the above, the meter cost of the project will have completely liquidated itself within fourteen months of the start of operation. After that time, 100% of meter receipts will be available to the city, amounting to a possible $100,000 a year. In addition, the building and improvements in the area adjacent to the lot will substantially increase the assessment value resulting in a large increase in taxes from that area.

Yes, Quincy has found the answer and it is no wonder ambitious plans are in the making there to greatly expand a project which has brought such prosperity to the city.



The above photo shows a group of ITE members immediately prior to enjoying a luncheon given by Minnesota Mining & Manufacturing Company during the recent AASHO Annual Meeting in Miami, Florida. Left to right are: Guy Kelcey, Kermit Rykken, Ed Wetzel (dark glasses), Burt Marsh, Ed Copell, Harry Neal, Roy Jorgenson, Don Opstad (Minnesota Mining), unidentified, Walter Gottschalk, Carl Fritts, Pyke Johnson and Grant Mickle. Kneeling: Harry Porter, Jerry Buckley and unidentified.



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Past Presidents' Award For Merit in Traffic Engineering

The Past Presidents of the Institute have created a PAST PRESIDENTS' AWARD FOR MERIT IN TRAFFIC ENGINEERING.

The award is to be made annually in an appropriate fashion by the Board of Direction.

The purpose of the award is to give recognition to the younger members for distinguished achievement in their chosen field. Therefore, the competition will be limited to Junior and Associate members of the Institute who will not have reached the age of 35 years as of the date of closing the competition.

To be eligible, an individual must have engaged in independent and original research or achieved some outstanding accomplishment in the field of traffic engineering. Any such individual, within the membership of the Institute and within the age limits, may enter the competition by submitting to the Board of Judges a written statement describing the project; its inception, conduct and conclusions. The statement is to be not less than 2,500, nor more than 5,000 words in length.

Competition for the year 1951 will close on August 1, 1951. Entries will be judged by a Board of Judges consisting of three Past Presidents, with the Immediate Past President acting as chairman.

Entries will be judged on the following basis:

1. The nature and usefulness of the contribution to the science or art of traffic engineering, and
2. The editorial content of the expository statement.

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Traffic Signal Blows Up

A. Wallace Gove (Assoc. Mem., ITE), Traffic Engineer, City of Worcester, reports a freak explosion of a set of traffic signals on the morning of January 2, 1951 injuring a police patrolman slightly and breaking windows in two passing buses at the intersection of Grove and North Streets.

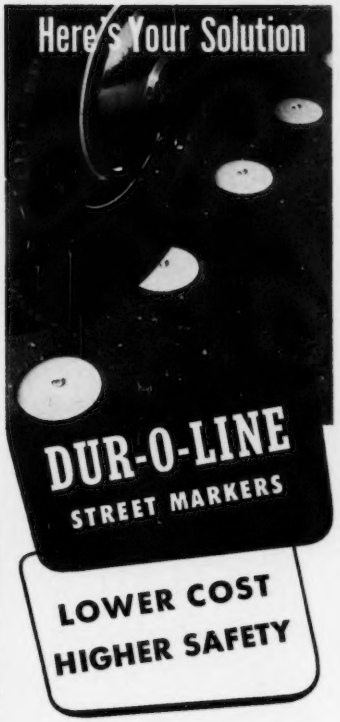
The blast was apparently caused by a leak of illuminating gas into a nearby electric light manhole and then into the base of the traffic signal post through the conduit carrying the power feed. It is believed that the gas collected in the signal heads and was ignited by an electric spark.

The blast blew in the direction that the signals were facing, portions of glass lenses and metal flying 50 to 75 feet.

The destroyed signal was a three-way, three-section head. The post mounted traffic signal controller continued to function after the blast; in fact several of the light bulbs were not broken by the explosion and continued to light until the power was shut off.

Sense and Nonsense

Reckless automobile driving arouses the suspicion that much of the horse sense of the good old days was possessed by the horse.



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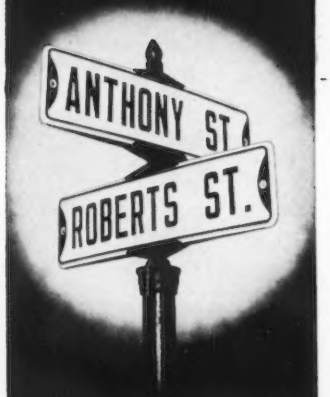

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Knowledge and Skill: Sound technical knowledge of traffic design, street design and maintenance, survey methods and technique, traffic control and traffic planning; good administrative ability; ability to get along well with people; and speaking and writing ability. Must be able to qualify as a registered engineer in the State of Ohio.

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Salary: Standard Rate 19. Entrance salary $296; maximum $360 a month.

Opportunities: One immediate appointment; others as needed.

Written Tests: On request, written tests may be given in other cities; personal interview, however, must be in San Diego. Undergraduates who will meet the minimum qualifications within 6 months may apply and be tested but will not be certified until they meet all requirements.

Minimum Requirements:

(1) *United States Citizenship.*
(2) *Residence in the City of San Diego,* within 60 days after appointment.
(3) *Age:* 21 through 40.
(4) *Education:* Graduation from college with major work in civil or traffic engineering.
(5) *Personal Qualifications:* Ability to plan, organize and supervise traffic engineering programs, to design and draft traffic control devices, to deal effectively with individuals and groups.
(6) *Loyalty Oath*—as required by City ordinance.

Place to Apply: Room 453, Civic Center Building, 1600 Pacific Highway.

Five Man Board of Engineers Named for District of Columbia

The District of Columbia Commissioners recently appointed a five-man board of engineers to administer a new law requiring the licensing of all practicing engineers here.

Board members, recommended by District Director of Inspection Robert H. Davis are:

Daniel C. Walser, civil engineer, member, president, named for a five-year term; Leo H. Cleary, electrical engineer, member, secretary, four years; M. X. Wilberding, mechanical engineer, member, three years; Martin T. Bennett, chemical engineer, member, two years; and Lee D. Purnell, unclassified member, one year.

Deputy Director of Inspection J. J. Ilgenfritz said the board will meet soon to set up the machinery for passing on qualifications.

The new law requires the licensing of all persons now practicing engineering, as well as newcomers to the field. After a date that will be set, the District will approve no plans involving an engineer unless the person has been licensed, Ilgenfritz said.

American Engineer
January 1951

Obituary

Sidney A. Anger, Associate Member, ITE, and City Traffic Engineer of Lansing, Michigan, died about midnight Monday, February 12, 1951, at the age of forty-nine. Mr. Anger had been stricken several weeks previously and was confined at the University Hospital at Ann Arbor. He had returned to his home in Lansing where he seemed to be recuperating until he suffered a relapse January 20th. He entered St. Lawrence Hospital in Lansing and had been under medical treatment since that time.

Sidney had been Traffic Engineer for the City of Lansing since 1936. Prior to that time he was Assistant to the Maintenance Engineer of the State Highway Department for fourteen years. During his career as Lansing's traffic chief, Mr. Anger was largely responsible for the development and maintenance of five municipally-operated off-street parking lots to relieve parking congestion in the downtown area.

Numerous surveys and suggestions which led to better traffic planning in the city were solicited by the city officials from Mr. Anger.

Municipalities throughout the country sent representatives to Lansing on occasions to consult with Mr. Anger regarding traffic matters and developments which he had successfully placed in operation.

Sidney became a member of the Institute of Traffic Engineers in 1942. Since that time, he was active in committee work and held the position of Vice-Chairman of the Institute's Sub-Committee on Traffic Signals at the time of his death.

He was also a member of the International Municipal Signal Association and had been active in the Lansing Kiwanis Club, having held offices of Vice-President and Secretary.

Secretary's Column

Your Executive Secretary has stated many times before in these columns that the "backbone" of the Institute is its Local Sections. Opportunities for the membership at large to get together on a common meeting ground through the national organization occur only *once* per annum. Local Sections provide additional and more frequent opportunities for an exchange of ideas, to swap notes on individual traffic engineering problems, to develop closer association of Institute members in the area and to establish cooperative relationships with other engineering groups on matters of common interest in the area. It is pleasing to note that two additional Sections will become a reality at the next meeting of the Board of Direction early in April. The Canadian members have submitted a formal petition for a Section covering all members in the Dominion of Canada. Members in the Missouri Valley area are combining forces to organize a Missouri Valley Section of the *Institute*. In addition, it is entirely likely that the Indiana members will soon form a Local Section. Other states and localities are contemplating activation of Sections at an early date. All of this activity is concrete evidence of an earnest desire on the part of members in the areas concerned for more frequent association. It further represents advancement and progress of the traffic engineering profession. It is hoped that all areas where members are considering Local Sections will follow the example set and make a banner year in *Institute* history for the establishment of new Local Sections.

The attention of all members is specifically invited to a questionnaire currently being circulated by your Sub-Committee on Professional Registration, under the chairmanship of J. C. Young, Traffic Engineer for the State of California. The committee is making an effort to bring up to date a similar survey conducted in 1946. From the information returned by the membership the committee hopes to formulate a policy on professional registration for consideration by the *Institute's* Board of Direction and referral to the National Council of State Boards of Engineering Examiners. The matter of professional registration and recognition of traffic engineering by individual State Boards is of primary concern to all members of the *Institute*. It, therefore, behooves us to make this a 100% return for the sub-committee. Although many State Boards now recognize traffic engineering, there are others that continue to ignore the profession entirely. The results of the survey now being conducted will go a long way in resolving differences that now exist. It is hoped that the end result will be recognition and acceptance by each of the forty-eight State Boards of Examiners.

We have previously mentioned in these columns that the Board of Direction was contemplating a move of national headquarters to Washington, D. C., in the establishment of a permanent location in that city. Unfortunately, the national emergency has resulted in a substantial decrease in advertising contracts from manufacturers; thereby forcing the Board of Direction to defer a decision on the move to some future date.

Plans for the Annual Meeting in Los Angeles are going forward at a rapid pace. Many Eastern members who have never visited the West Coast are planning vacation trips to include the Annual Meeting. From all indications, barring a change in the international situation, we will have a record attendance. Detailed information concerning the Annual Meeting is being furnished to the *Institute* membership. All subscribers to "Traffic Engineering" magazine are cordially invited to attend. Information will be gladly furnished upon request to *Institute* headquarters.

Robert S. Holmes

Army Official Sees Eventual Cutbacks in Auto Production

Under Secretary of the Army Archibald S. Alexander told the American Society of Automotive Engineers, at its recent meeting in Detroit, that, "The impact of the defense program on the automotive industry will be tremendous." He said that, while no contract the Army has let to date will directly put out of production any existing assembly line, "there is no doubt that many companies will soon have cutbacks in civilian production caused both by the need for producing defense items and by the scarcity of raw materials for civilian items."

Mr. Alexander pointed out that the Army plans to spend more than $4 billion for the fiscal year 1951 "in the tank-automotive field alone."

National Defense

Personalities . . .

DWIGHT M. McCRACKEN, a New Englander since 1935, was born in Muskegon, Michigan; lived in Arizona long enough to tell tall stories of his cowboy days to his three children; then moved to Los Angeles where he attended Los Angeles High School and UCLA.

He transferred to Boston University for his senior year in order to help care for his sister living in the East who was seriously ill at the time. After finishing at Boston University with a B.S. degree, he obtained a Master's Degree from Graduate work at the Harvard University Bureau of Street Traffic Research.

Dwight worked as a traffic engineer in the Massachusetts Department of Public Works in 1931 and the Massachusetts Highway Accident Survey in 1933. He returned to California for two years as a Traffic Auditing Engineer of Southern California. Since 1935 he has been with Liberty Mutual Insurance Company in Boston—as Highway Safety Supervisor, Engineering Department, 1935-40; Director of its Traffic Safety Bureau, 1940-45; and since 1945, Manager of its Motor Transport Bureau. He was made an Assistant Vice-President in May 1949.

He has been a member of the Institute of Traffic Engineers since 1935 and has been active on many of its technical and administrative committees. He is a member of the Insurance Advisory Committee.

Dwight's hobbies are fishing and hunting (with his sons), tennis (with his wife), and keeping up with the latest songs (with his daughter).

After attending Duke University and receiving a B.S. degree in Civil Engineering, CLIFTON G. STONEBURNER, a native of Arlington, Virginia, returned to this community where he was employed in the Engineering Department.

In 1936, he became Traffic Engineer and Assistant County Engineer. In 1945, when the Engineering Department was reorganized and a Department of Public Service created, "Stoney" was made Highway Engineer which office includes the traffic engineering functions.

He is a registered engineer in the State of Virginia; a member of the Institute of Traffic Engineers, Past President of the Washington Section ITE; and a member of the American Society of Civil Engineers. Since 1939, he has been Executive Director of the Arlington Safety Council. Also, he has been Secretary of the Arlington Public Utilities Commission for the past four years, and is at present District Chairman for the Arlington District, Boy Scouts of America.

Stoney's favorite recreation is softball, which he has been playing too many years to mention! He is Director of the Northern Virginia District of the Virginia Softball Association. His favorite card game is bridge, which he manages to find time to play occasionally.

Stoney is married and has two sons, one 8 and the other 4.

Division 2 of the Bureau of Public Roads will move in the near future from Washington, D. C., to Hagerstown, Md.

Off-Street Parking Facilities Upheld By State Supreme Court

On September 21, 1950, the Illinois Supreme Court handed down a decision upholding the constitutionality of an Illinois statute authorizing municipalities to provide off-street parking facilities. In the same decision, the court upheld the validity of an ordinance adopted by the City of Kankakee pursuant to the statute. (Poole et al, v. City of Kankakee et al, 94 N.W. (2d) 416.)

The case came before the court as a result of a complaint by several citizens of the City of Kankakee who sought to enjoin the city from acting under the provisions of an ordinance adopted by the city for the purpose of acquiring land to be used for the operation of off-street vehicle parking lots in the business section of the city.

The State statute under question authorizes municipalities to acquire, own, construct, equip, manage, control, erect, improve, extend, maintain and operate motor vehicle parking facilities. Land may be acquired by eminent domain. Bonds may be issued to pay for the purchase, such bonds to be payable only from the proceeds of operation of "any or all" of the city's parking facilities. Corporate authorities are to establish fees, if bonds are issued, sufficient to defray the cost of operation and maintenance plus payment of principal and interest on the bonds. Municipalities may lease facilities to the highest bidder and may make reasonable rules regarding the use, management and control of the parking facilities. (Illinois Rev. Stat. 1949, chap. 24, Art. 52.1-1 to 52.1-10.)

Highway Research Correlation Service
December 1950—Circular No. 123

Governor Dever Backs Defense Road Construction

Governor Paul A. Dever of Massachusetts has stated that "so-called luxury road building" is out for the duration of the present emergency. He said this will mean postponement of various construction jobs in metropolitan areas. In a public statement he declared, "The only road construction to receive my approval will be that with a definite defense utility, either for military use or for service in evacuation."

LOOKING AHEAD

APRIL 3-6, 1951—NEW YORK, N. Y.
Twenty-first Annual Greater New York Safety Convention and Exposition. Hotels Statler and Governor Clinton. Contact: Paul F. Stricker, Executive Vice-President, Greater New York Safety Council, Inc., 60 East 42nd Street, New York 17, N. Y.

MAY 30-SEPTEMBER 9, 1951—ARCADIA, CALIFORNIA
World Transportation Fair, Santa Anita Park.

JUNE 3-8, 1951—FRENCH LICK, INDIANA
Society of Automotive Engineers. Summer Meeting.

JUNE 4-8, 1951—CHICAGO, ILLINOIS
Midwest Safety Conference. Congress Hotel. Contact: Joseph F. Stech, Manager, Greater Chicago Safety Council, Suite 805, 10 North Clark Street, Chicago 2, Illinois.

JUNE 21-23, 1951—SALT LAKE CITY, UTAH
Western States Safety Conference.

AUGUST 27-30, 1951—WASHINGTON, D. C.
Illuminating Engineering Society. National Technical Conference. Hotel Shoreham.

SEPTEMBER 16-19, 1951—DETROIT, MICHIGAN
American Public Works Association. Public Works Congress and Equipment Show.

SEPTEMBER 17-20, 1951—SAN FRANCISCO, CALIFORNIA
56th Annual Meeting, International Municipal Signal Association, Inc. Mark Hopkins Hotel.

SEPTEMBER 24-27, 1951—LOS ANGELES, CALIFORNIA
Annual Meeting, Institute of Traffic Engineers. Ambassador Hotel.

Membership Information
may be obtained by writing to
Executive Secretary
Institute of Traffic Engineers
Strathcona Hall
New Haven 11, Connecticut

SECTION NEWS

Michigan Section

Sixty-one members and guests of the Michigan Section, ITE, met at the Public Light Clubhouse in Detroit on January 24, 1951. Many of those present arrived early and enjoyed the hospitality of the Scotchlite Company. After an excellent steak dinner, which was served by the Detroit gang, the meeting was called to order by President Bauerle at which time he requested those present to rise, give their name and affiliation and introduce their guests so that all present might get better acquainted. The President's suggestion that a vote of thanks be given the dinner committee received unanimous approval.

President Bauerle informed the group that two of the members were confined to bed. Mr. Sid Anger, Traffic Engineer, City of Lansing, is now in St. Lawrence Hospital and Mr. Carl McMonagle, although at home, still has his legs in casts. All present were requested to affix their "John Henry" on two specially prepared get-well cards.

The President announced that the Michigan State Conference would be held in Grand Rapids in May. Jerry Franklin is serving as program chairman for the Planning and Traffic Section of the Conference. Others on the committee are Russ Harrison, Harold Bauerle and Al Sherman as secretary. A tentative program was outlined to the group for comments. Mr. Malo commented that the variety of subjects submitted should provide a very interesting meeting. The President announced that Michigan Section would probably meet at a luncheon on the first day of the conference in lieu of the May meeting.

Mr. Joe Wehmeyer outlined the Board of Direction's policy regarding holding their quarterly meeting in different districts each year and informed the group that the possibility of holding a joint meeting with the Michigan Section had been discussed at a Board meeting. The President announced that such a communication had been received from the Executive Secretary. He pointed out that undoubtedly a June meeting might be more desirable due to the inclement weather that might be expected prior to that time, which would eliminate the possibility of having any outdoor activity in connection with the meeting.

It was announced that the next meeting would be held in Grand Rapids in connection with the Michigan Highway Conference. The meeting will be in the nature of a luncheon and will be held on the first day of the conference.

President Bauerle then announced that the meeting held certain international significance and introduced Mr. Orhan Barim, Chief Traffic Engineer, Ministry of Public Works, Turkey, who is in this country as a representative of the Balkan countries in the Transport and Communications Division, Economic and Security Council of the United Nations. Mr. Barim (graduate Engineer, U. of M.—1944) gave a very interesting account of the discussions relating to the adoption of uniform standards of signing and signals at the International Road Congress held at Geneva in 1949, where some 39 countries were represented.

Mr. Barim discussed the many difficulties encountered at that meeting with the result that little was accomplished. Many of the difficulties arise because of the many languages encountered throughout Europe and the Far East. The principal difficulty, however, appeared to be unwillingness on the part of those present to cooperate in finding a common basis for discussion.

Mr. Barim described the more recent discussions on signing and signals by the Transport and Communication Division within the United Nations setup. There are seven delegates representing geographic areas rather than countries. The objectives of this delegation are to bring about adoption of uniform signing and signalization based on a scientific approach rather than a political maneuvering. It is the intent of the group to conduct field examination and tests to determine the effectiveness of both European and American signs. Mr. Barim felt rather optimistic that the scientific approach would bring about real results, especially so since there was a willingness on the part of each delegate to cooperate to reach these objectives. He pointed out that basically there was much similarity between American and European warning signs. He felt, however, more difficulty would probably be encountered in establishing uniform standards for regulatory signs.

Mr. Barim said that he would like to briefly discuss the Marshall Plan, particularly as it has affected his country.

He said he had noticed, since his arrival in this country, that much had been said both pro and con regarding the plan and yet the public is little informed as to how the money is spent or of what benefits have been realized. He gave a brief history of the transportation and economy of his country. He pointed out that not until 1946 did highway development get started. At that time a Department of Highways was organized and with assistance of American engineers and equipment many miles of highways have been built. He pointed out that all of the $18½ millions allocated for roads had been used for American equipment and materials. All Turkish personnel were paid out of Turkish funds.

Mr. Barim pointed out that this, together with other similar projects, is doing much to strengthen the economy of his country. He said that his countrymen were deeply appreciative of these benefits as witnessed by the fact that their ministry had received an expression of gratitude and appreciation from an "Association of Professional Drivers" (50,000 professional drivers) for the benefits that they had derived from the development of their highway system. He pointed out that the reduction in time alone amounted to ⅓ of the previous time and in many instances, the driving time had been reduced by one-half.

Mr. Barim pointed out, however, that there still remained much to be done particularly in accident prevention. He said that if Turkey's accident rate had prevailed in United States for the past year, we would have killed approximately 1,700,000 people. He indicated that there is much to be done in the way of education and enforcement before there can be a material decrease in the accident rate in his country.

President Bauerle then turned the meeting over to Mr. Russ Harrison, who had served as program chairman for the evening and he in turn introduced those who had served on the banquet committee. They are as follows:

Arrangements—Art Gibson
Publicity and Finance—Herm Botts
Food and Dinner—Al Hanson, Busk DesRoches, Sven Kansman, "Sy" Bergsman, Bill Leighton.
Raffle-Prizes—Tony Troszck

Mr. Harrison (a former U. of M. man) with some reluctance, but not before recalling earlier and better days, introduced Mr. Vogler, Assistant Coach at Michigan State College (Captain 1949 Team) who gave an interesting discussion of the present staff and anecdotes regarding the staff and players of last year's team. Mr. Vogler then presented moving pictures of the Michigan State-Notre Dame game and gave a running account of each play. Just prior to adjournment prizes were raffled off by our energetic program committee.

A. C. Sherman
Secretary

New England Section

Robert Mitchell, President, presided at the January 18th meeting in New Haven, Connecticut. The metting was well attended by fifty members and guests; the latter group was composed of police officials from various communities throughout the State, and Providence, Rhode Island.

During the short business session, the chairman introduced two new Junior members of the ITE, namely, Orman K. Anderson, Mississippi State Highway Department, at present a student at the Yale Bureau, and Edward G. Mogren, Resident Traffic Engineer, Eno Foundation. He also informed the Section that Paul Green of Automatic Signal Corporation has been elevated from Associate to Member.

Wilbur Smith, program director for the meeting, introduced the topic for the evening, "Traffic Engineering Problems and Traffic Law Enforcement." Members of the panel were Foster M. Kunz, Special Agent with the Federal Bureau of Investigation, Washington, D. C., and John Gleason, Chief of Police, Greenwich, Connecticut.

Mr. Kunz reviewed the scope of the enforcement problem, pointing out that studies made for more than 1800 cities, representing approximately 50,000,000 inhabitants of the United States, showed that nearly 12,000,000 traffic violation arrests were made in that group of cities during a one-year period. Police estimate that for each arrest approximately three police warnings are issued for observed traffic violations. The number of violations that occur outside the scrutiny of police is impossible to assess, but the available evidence indicates that almost every driver is a violator at some time or another.

Drivers are generally aware of their transgressions and each appears to violate with the attitude that his personal judgment is better than the law. Speed studies made on the Merritt Parkway indicate that when drivers are plainly warned that their behavior is being observed, they immediately observe the posted limits, but when they think no one is watching their speeds average about 10 m.p.h. faster. This attitude is a problem for both the psychologist and the traffic engineer.

Mr. Gleason spoke on the importance of highway transportation to the nation. He stated that the problem of traffic regulation has suddenly become a new and important field of public work, too often at the expense of the more conventional problems of police protection against crime.

He pointed out that the traffic police have a thankless task. Since everyone is a potential violator of traffic regulations, violators who are brought before a jury are almost sure of a sympathetic decision, since each juror can visualize himself in the shoes of the accused. Relatively few arrests result in convictions and fines. Thus, the public as a whole is apathetic to the problems of the traffic police.

He stated that traffic engineers have not made enough use of the accident reports prepared by police. It is not possible to make traffic engineers of the police he said, and if accident experience is to result in proper corrective measures more attention must be given to the data at hand.

Touching on the war emergency, Mr. Gleason concludes that "in the event war comes to United States soil, the need for adequate roads will be twice as great. The movement of troops and rescue equipment, and the travel of workers to and from employment, will be vitally important in the protection of our nation. Highways are *not* expendable in peace or war. To insure

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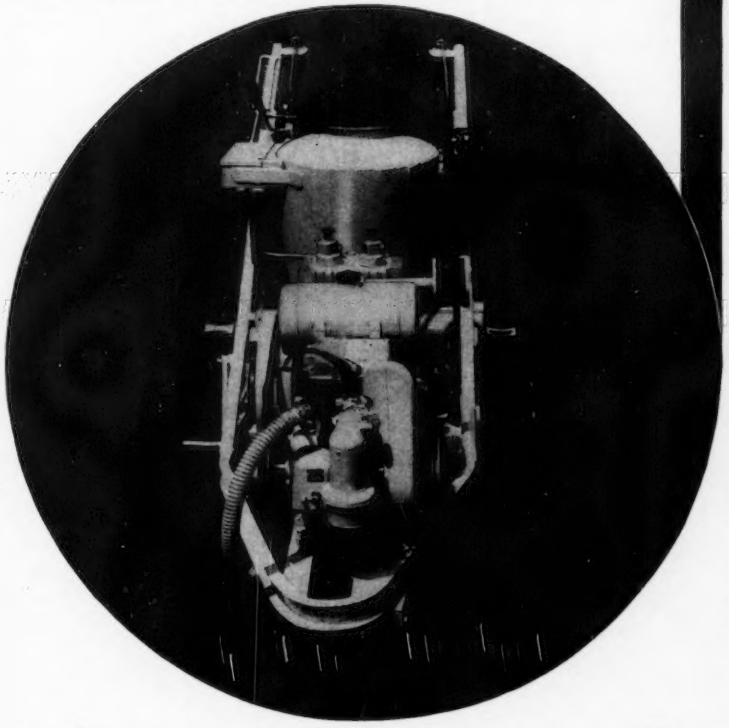

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The "heart of the striper" is a constant 100% air reserve supply, maintained at all times during operations without burdening the compressor or motor, continuous efficient operation is assured as a result of this reserve air capacity.

Anti-vibration frame construction is of channel and tubular steel, with pneumatic and zero pressure wheels, front tire is puncture proof.

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Operates at 2 to 5 M.P.H.; ribbed drivers insure positive drive. Large compressor (12.5 cu. ft.) handles thinnest paint to thickest compound.

Tank (12 gallon) has wide mouth (5.75 in.) with strainers in paint line for easy removal of foreign matter.

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adequate national defense the nation *must* construct vital new roads."

After a lively discussion of the topics touched on by the speakers, the chairman adjourned the meeting at 10:15 P.M.

F. Houston Wynn
Secretary-Treasurer

Western Section

A very successful meeting of the Western Section was held at Sacramento on the evening of December 7 as a part of the Governor's Traffic Safety Conference. NICK CARTER arranged a very fine dinner at the University Club, attended by about 150 engineers, many of whom were members of the ITE. At the meeting also, BRUCE CRANDALL gave a short talk, and RALPH LUCKENBACH talked on membership in the Institute of Traffic Engineers.

A fine series of meetings of the Engineering Division, Governor's Highway Safety Conference, was held, with many ITE members participating. Ten recommendations were prepared and presented at the final session on the afternoon of December 8, with most of the recommendations dealing with the application of traffic engineering principles.

President FRED FOWLER has appointed Area Chairmen for the coming year, as follows:

Northern California Area—
ROSS T. SHOAF, Traffic Engineer
Department of Public Works
San Francisco, California

Southern California Area—
CLIFFORD C. CLARK JR.
122 S. Maple Drive
Beverly Hills, California

Arizona, New Mexico Area—
A. GLEN SMOOT, Traffic Engineer
Arizona Highway Department
Phoenix, Arizona

Washington Area—
WINSTON H. CARSTEN
Ass't. Planning Engineer
Washington Department of Highw'ys
Transportation Building
Olympia, Washington

Portland Area—
VAL JOHNSON
Traffic Control Engineer
Oregon State Highway Department
P. O. Box 30
Salem, Oregon

ON THE SHELF

Compiled by
Mrs. Kathryn Cassidy, Librarian
Yale Bureau of Highway Traffic

American Association of Motor Vehicle Administrators

Driver Improvement Through Licensing Procedures; a Guide for Driver-licensing Authorities in the Control of Drivers with Bad Records. The Association, Washington 6, D. C. 1950. 112pp., illus. $2.00.

Prepared under a cooperative agreement between the Bureau of Public Roads, . . . and the Traffic Institute, Northwestern University, by James Stannard Baker, for the Committee on Driver Licensing of the American Association of Motor Vehicle Administrators.

American Association of State Highway Officials

Proceedings, Convention Group Meetings, Papers and Discussions, San Antonio, Texas, 1949. Washington, D. C., The Association, 1950. 312pp. $4.00.

American Association of State Highway Officials

Specifications for Concrete Pavement Construction. New and revised edition, approved as an Association Policy, July 30, 1950. The Association, 1950. 75c.

"Correlation of recommended standards of design and maintenance, representative of the best current practices for cement concrete pavement construction."

Berkowitz, S. M.

Simulation as a Means for Analyzing Airport Capacities and Methods of Airport Surface Control. The Franklin Institute Laboratories for Research and Development, Philadelphia 3, Pennsylvania. 1950. Prepared under contract Cca-28365 for the Air Navigation Development Board. Final Report No. F-2164-4.

The contract under which this work was done states: "Submit recommended designs of a simulator for determining quantitatively the relationships among the important variables involved in airport surface control." . . . "The object of this report is to point out the relatively simple means by which simulation can be used to analyze airport capacities and to evaluate various methods of airport surface control for a wide variety of conditions, rules, availability of facilities, aircraft types, aircraft performance, safety considerations, airport configurations, etc. (It) discusses many situations involved in moving aircraft on the surface of an airport, the proposed methods for controlling aircraft on the ground, procedures, rules of logic, airport configurations and the various simulative means for analyzing and evaluating all of these factors."

Delaware State Highway Department

Report of the Wilmington Metropolitan Area Transportation Study Arterial Route Analysis with Ultimate and Interim Plans. Prepared by the Traffic and Planning Division, Delaware State Highway Department in cooperation with U. S. Department of Commerce, Bureau of Public Roads, the Mayor and Council of Wilmington, New Castle County Levy Court. The Highway Department, 1950. 36pp., maps, tables, graphs.

Survey and a five-point program embodying: 1. Construction of new arterial routes and improvement of existing ones; 2. Improvement of distributor streets; 3. General improvement in operation of existing facilities; 4. Solution of the terminal problem by improvement of parking facilities; 5. Continued improvement of mass transportation.

Griffenhagen and Associates

Highway Finance and Taxation in New York, prepared for the Citizens Public Expenditure Survey, Inc. of New York State. Citizens Public Expenditure Survey, Inc., 100 State Street, Albany 7, New York. 1950. 230pp., appendices, mimeo. $3.00.

A detailed report on the New York highway systems and their finances, the highway revenue sources and a proposed basis for the financing of highways. The report attempts to answer two main questions: 1. "What share of highway costs in New York should be borne by the highway users?" and 2. "How should the highway user share be divided among users (i.e., what should the user tax rates be) at various highway expenditure levels?"

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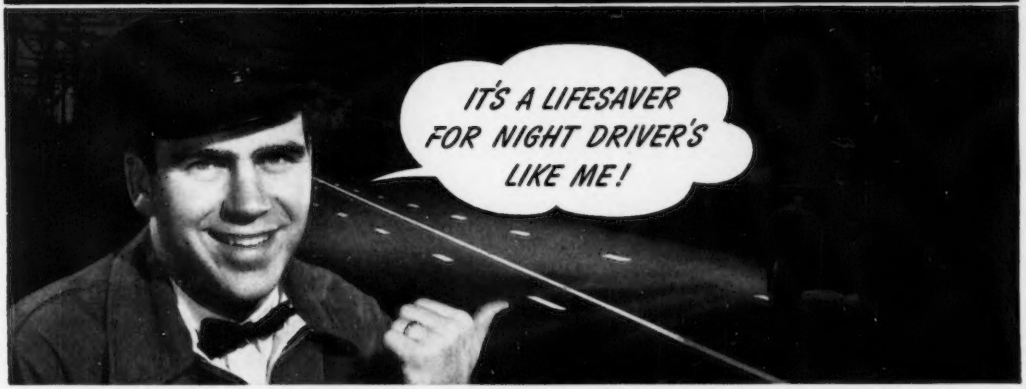

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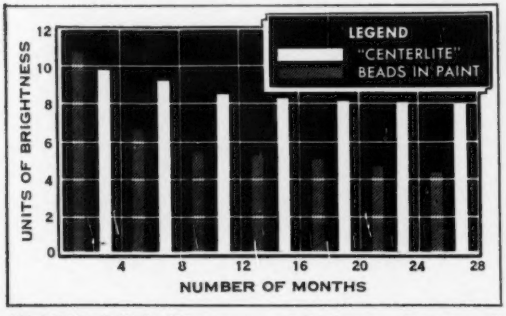
*Kelly Creswell, Meili Blumberg-Linograph



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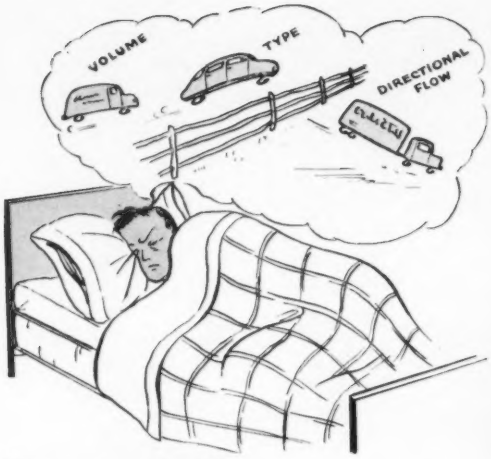

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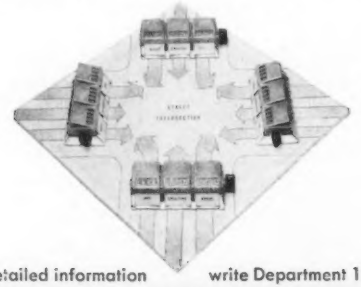

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